UNIVERSITY OF TORONTO
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THE
TRA PHARMACOPŒIA

MARTINDALE
AND
WESTCOTT

VOL. I

SEVENTEENTH EDITION

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Martindale, William

THE
EXTRA PHARMACOPŒIA
OF
Martindale and Westcott

REVISED

BY

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SEVENTEENTH EDITION.

IN TWO VOLUMES.

161282.
25.4.21.

VOL. I.

LONDON:
H. K. LEWIS & Co., LTD.
1920.

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VOLUME I.

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PREFACE.

Our last edition was issued in January, 1915, shortly after the war had begun. In the preface to that edition we expressed the opinion that the war, caused as it was by Germany's long conceived desire to ruin and destroy the British Empire—her best friend commercially—would inevitably render German medicinal preparations unpopular, in all probability, for generations.

The war has been won by the British Empire and her Allies, and there is now an opportunity to reflect not only on its causes, but also on some of the illustrations which the war afforded of the dependance of the whole world upon chemical and medicinal knowledge, the debasement of that knowledge by its use as a means of torture as well as of slaughter and destruction, its teachings in the treatment of wounds and the evolution of fresh knowledge to clear up the disease-stricken pathway of war, and, quite incidentally so far as this book is concerned, to speculate on the possibility of inculcating some minute degree of foresight in safeguarding our national life.

The work of the average medical man brings him as a rule but little acquaintance with the bear-pit of commerce. He knows little or nothing of the source of the chemical he prescribes or of the problems involved in its production or its transport. It is perhaps hardly his business. Before the war he knew that Professor So-and-So of Bonn or Berlin, advised its use and that other factors were in its favour.

Even during the war official instruction was necessary to inform him that such and such chemical substance was wanted for war purposes, and that the prescribing of 'synthetics' previously made only in Germany, should be replaced by simpler old-fashioned remedies.

Let it be understood that we do not blame the medical man for his lack of knowledge in these matters. We merely state our case as we find it so that our readers may follow our brief discourse.

It might be held that so far as the *volume* of commerce is concerned this slight remissness on the part of the learned profession could have little effect, and that is in reality the crux of the matter. If we persistently encourage our envious rival in *every* walk in life, if we allow no discrimination among our imports, if we permit and encourage foreigners to obtain patents and trade marks without even troubling about reciprocating, if, in short, we allow our activities of every kind to be dominated, undermined, saturated and obsessed by these and other kinds of peaceful penetration, we should not wonder, indeed we ought not to complain, that the tentacles of the octopus, however gentle and pleasant at first, ultimately grip with a strangle-hold which, if continued a little longer, would obviate the necessity of going to war at all.

Apparently none of us imagined that the brilliant synthetic chemists in the German factories—some of these factories it was common knowledge employed 'hundreds'—would so quickly change over to the manufacture of explosives and poison gases.

A firm in Berlin—world renowned for its brand of fine chemicals—for example supplied the Phosgene bombs, and the whole gamut of inorganic and organic chemistry seems to have been ransacked to provide 'synthetic' compounds possessing the most villainous properties. Phenyl-carbylamine chloride, a lachrymator had its turn, Di-phenylchlor-arsine, a sneezing gas was conceived as serviceable and so on. (A fairly comprehensive list of these weapons in humane warfare is to be found in the "Chemist and Druggist," May 11th, 1918, page 372). The members of the German Chemical Society no doubt fully appreciate the honours of congratulation accorded them on their labours by the ex-Emperor.

We have in mind a visit we received from an Army Medical man attached to an Experimental Station when the use of one of these chemical agents had been started—to be precise, in August, 1917. He bared his arm showing Di-chlor-ethyl-sulphide (Mustard Gas) blisters self-inflicted experimentally, and he asked our assistance in the direction of healing them so that the information gained could be of service to our men at the front.

This oily liquid (though usually called Mustard 'Gas') rapidly soaks through clothing and forms intractable blisters (appearing in a delayed manner) which take weeks to heal in the ordinary way. We understand the special theory of scientific action anticipated by the Germans was that it would attack our soldiers at the fork. (Its principal effect is upon the moister areas of the skin, especially the bathing-drawers area and the axillary folds as well as on the mucous membranes, beginning with the conjunctiva, nose and mouth and soon extending downwards throughout the whole respiratory tract.—L. i./19,471).

Numerous experimental ointments were made for our visitor, even one containing Nitric Acid because a powerful oxidising agent seemed indicated. An ointment of Chlorinated Lime ultimately proved the best to counteract local effects.

Now the moral of this little incident with its wide sweeping side-issue is that the Germans *knew beforehand* the peculiar delayed effects of Dichlorethylsulphide.

Prof. Leonard Hill (B.M.J. ii./15,801), states that examination of the back volumes of the *Archiv fur Hygiene* shows that poison gases were investigated for years by Lehmann and his pupils from the ostensible point of view of making dangerous trades safe for the workmen engaged.

We take it that Britain had little, or indeed none, of this information ready and classified. On the contrary, long after the use of asphyxiating gases had been started, our professors commenced experimenting on animals with Chlorine, Bromine, etc., and communicated their results to various scientific journals. (See our summary in the Antidotes to Poisons Chapter under Chlorine.) It is not, perhaps, to the discredit of Britain that Britons had not contemplated the use of Mustard Gas—they never would have contemplated it as a weapon of war, but the experience of its use should not be forgotten. Are we to assume that its military career and that of many other chemicals are ended for ever and that none of them will again be used against us—when the opportunity occurs, as it must? If not we need self-preservation in commerce, in education, as well as a powerful Navy.

Sir Ronald Ross has remarked that Great Britain had reached her lowest point of intellectual development before the war; this is a picturesque way of stating that we need a better general knowledge, particularly of science. Is not the chief lesson of the war the need of greater and more widespread scientific education?

If the ordinary man's education were but a little more scientific we should not find a member of the Government announcing in all good faith that it had *recently been discovered* that glycerin can be prepared from fats, a fact proved by Scheele in 1779, and familiar to every soap maker since.—(B.M.J. i./16,695).

At least one valuable and useful British scientist's life was lost in laborious experiments in inventing a respirator for soldiers and sailors to protect them against Chlorine and other asphyxiating gases in the late war long after it had started. In the next war may it not be necessary to find means *in a few hours* to save the entire population of a country from scientific annihilation?

To sum up and to close this brief introduction, we may say that though our commercial door must (apparently) always be open we must claim and exercise the right to choose what and who shall pass through it and to consider whether it is not better to teach our own people the art *to manufacture* than to devote our national resources wholly to buying and providing the means to buy.

We do not wish these remarks to be misunderstood—*we are heart and soul with every injunction to forgive, but we claim that to forget would be an insult to the memory of the dead and an injustice to those for whom they gave their lives.*

The long interval which has elapsed since our last edition has resulted in a wholesale revision of the standing matter. Much had become old-fashioned and could well be omitted.

Indeed, we have even found it necessary to reject matter which we had specially written for *this edition* as being out of date. Such is the rapid march of science.

Owing to the general difficulties of the times and to hasten publication we have thought well to issue the first volume of the book *in advance*, to be followed as quickly as possible with the second. The latter will deal as in the past with methods of assay and testing of drugs and chemicals, clinical analysis, bacteriology and clinical notes in reference to special diseases, the composition of proprietary medicines and other subjects, while the volume under consideration includes information which the physician and pharmacist require for immediate reference. (We have transferred to Volume II. the sections on Iontophoresis, Radiology, Radium and Disintegration Products of Thorium).

Of NEW BOOKS which have appeared since our last issue we would specially mention the Ninth Decennial Revision of the Pharmacopœia of the United States of America. The numerous references to 'U.S., VIII.' in our last edition have been brought up to date and corrected in the light of this new issue.

We here take the earliest opportunity of tendering our hearty thanks to the Board of Trustees of the United States Pharmacopœial Convention for permitting us to use portions of the text of this new edition (note the acknowledgment on reverse of the title page).

A supplement (1914) to Ph. Nederlandsche Pharmacopee has been issued, and quite recently (1920) an Addendum to the French Codex.

A new Italian Pharmacopœia is in course of compilation.

A work by Professor G. T. Morgan, F.R.S., D.Sc., entitled ‘Organic Compounds of Arsenic and Antimony” (1918), is little short of classical and a valuable study of this important section of chemistry. We have had occasion to make abstracts from it.

Atomic Weights. The numerous alterations in the latest (1917) atomic weights, *e.g.* in the case of Carbon, Lead, Sulphur, Tin and Uranium—to name the important ones only—created a very considerable amount of work for us. The change in the case of Carbon from C=12·0 to C=12·005 necessitated alterations in some hundreds of complex organic compounds.

A short survey of the **New Chemicals and Drugs** and new methods of using older remedies described in our pages may be of interest:—

Acidum Hypochlorosum. Although the method of making Hypochlorous Acid by interaction between Chlorinated Lime and Boric Acid is a method which has been known for many years, the use of a dilute solution of the acid made by this interaction as a dressing for wounds is relatively new. Under the name **Eusol** a solution of this kind has been extensively employed for its antiseptic power. It was advocated as a first dressing in the field to prevent sepsis. It is further admirable in general practice at home. Deleterious effects are absent even on devitalised tissue. We deal fully with its methods of application and some of its limitations. It has been tried intravenously in grave toxæmic conditions.

A Solution prepared by the interaction of Chlorinated Lime and Sodium Carbonate with subsequent approximate neutralisation with Boric Acid as advised by H. D. Dakin has also been largely used. It contains a balanced mixture of hypochlorite and pyloborates of sodium with small amounts of free hypochlorous and boric acids. The use of boric acid in this case is not to liberate hypochlorous acid. The solution can be made in concentrated form and it keeps better than the foregoing. The *Carrel-Dakin* process of irrigation of wounds is described.

Arising out of the utility of the Hypochlorous Acid and Hypochlorites certain compounds known as **Chloramines** (originally studied by Chattaway some 15 years ago) were resuscitated and brought into service as Chlorine generators. Chloramine-'T' (the 'T' indicating that it is made from Toluene and to differentiate the substance for another reason) is easily made from *p*-Toluene-Sulphone-Chloride, a cheap by-product in making Saccharin.

Dakin evolved some theories around these bodies. It appears that they are formed in wounds when wounds are treated with Hypochlorite Antiseptics—Hypochlorous Acid acting on protein and allied bodies containing the =NH group effects a substitution of the H atom by Cl and the Chloramines thus produced are in themselves potent antiseptics.

Now that British Saccharin is available the by-product wanted as starting point will no doubt be readily available. It was wanting in any quantity when we ourselves required it in the early days.

These Chloramine compounds have one good feature from the manufacturer's point of view—they seem all readily crystallisable.

We had occasion to experiment with them at the time when Liquid Paraffin preparations for wound treatment were so much in evidence. Numerous rather roundabout oily solutions have been made with this Chloramine-T.

We provide some criticisms of Chloramine-T by the opposing school. It always appears to us that a substance requiring a lengthy period of time, *e.g.*, in this case of the dimension of two hours and upwards as the period of contact with the test organism, has a *prima facie* rather weak case. Chloramine-T and the Hypochlorites according to the opposition interfere with phagocytosis.

Aspirin.—Now that aspirin is manufactured in this country there has been a stimulus to research surrounding it. Though initially not quite pure it was only a matter of a few months to perfect the quality and to make it equal to or better than the German article. The results of our investigations as to the hydrolysis of the acid when taken internally have recently been confirmed by Prof. H. Llewellyn Smith.

We have always held a brief for the salts of the Acid—viz.:—Tylcalsin and Tyllithin—respectively the Calcium and Lithium salts—they are rapidly soluble substances—1 in 6 and 1 in 1 respectively as against aspirin 1 in 400 of water. They are hence remedies of prompt action in comparison. It is true they cannot be made of absolute purity as the moisture of the atmosphere causes a slight splitting off of Acetic Acid but this has never been known to be a detriment. A medical man, wishing to draw a comparison, to employ the Salicylic radical for its antirheumatic action would in these days give one of its Salts in preference to the parent Salicylic Acid.

We have been working on the Magnesium Aceto-Salicylate (Magisal). It is also an interesting compound.

Antimony Compounds.—The author's INJECTIO ANTIMONII OXIDI has been used with success in Leishmania infections, (Kala-azar) and trypanosomiasis. The subcutaneous injection is painless and a more extended use of the preparation is thought well deserved.

When a bolder dose is required and greater concentration we have introduced tentatively an Injectio Antimonii Oxidi Fortior, but the results of pharmacological experiments with it, quite recently to hand show that it is very potent and caution will be needed.

In view of the chemical analogy existing between Arsenic and Antimony it would be of great interest to try these preparations in syphilis and malaria. The relative simplicity of the components of these injections is a point in their favour. It may be mentioned that the use of a mere *suspension* of Antimony Oxide in water has nothing in common with the author's claims for his preparations.

A medical man in South America has been particularly persevering with the smaller Weaker Injection—he has, in fact, given intravenously the equivalent of 1 grain of Antimony Potassium Tartrate with it.

In bilharziosis **Antimony Sodium Tartrate** has proved of undoubted efficacy by injection in relatively massive doses and by a course of treatment extending over a lengthy period.

Antimony Potassium Tartrate intravenously has been proved to have quite powerful action in trypanosomiasis, espundia, granuloma inguinale, kala-azar and oriental sore ; it has proved efficacious also in yaws and of benefit in relapsing fever under the guidance of A. Castellani.

In bilharziosis remarkable results have been achieved by small doses with a total of 30 grains spread over a period of some 30 days. (J. Christopherson). It is stated that the patient ceases to be a carrier after 20 grains have been administered.

With **Antimony Ammonium Potassium Tartrate** we have had a fresh series of animal experiments conducted by a well known pharmacologist. The report is that though the equivalent of 0·025 Gm. in a 2½% solution as a single dose subcutaneously could be tolerated by a cat and therefore by man, repetition of such a dose might prove dangerous and that without warning.

Arsenobenzol.—Treatment of syphilis with this substance seems to have settled down to a combined Arsenobenzol plus Mercury medication. The courses advised by the War Office method are described. W. H. Willcox states that a full dose of Arsenobenzol (0·6 Gm.) is not completely excreted until three weeks have elapsed. An interval of four weeks should if possible be allowed between full doses. (It may be recalled that when Salvarsan was first put on the market by Ehrlich it was claimed, on the basis of 30,000 clinical cases, that one dose was sufficient to cure. Now it appears that treatment should be maintained for three years).

It has been stated that Novarsenobenzol subcutaneously influences the syphilitic lesions more rapidly than intravenous doses of Arsenobenzol.

The use of a solvent containing Guaiacol and Glucose has been found to produce a painless intramuscular injection.

The substance Galyl has been favourably reported on by the Royal Commission on Venereal Diseases.

Hexamino-Arsenobenzene and Triamino-Phenylarsinic Acid are recent developments, the former with powerful spirrillocidal action.

Bismuth Iodoform Paraffin Paste, briefly designated **Bipp,** if carefully used and in moderation has been very efficacious as a wound dressing. Using this preparation wounds have been closed without tube or other drainage than is allowed for between interrupted sutures. The method combines a maximum amount of rest to the wound, a persistent storage of inhibitory antiseptic and a minimum amount of attention.

Caffeine Tri-Iodide.—This periodide containing as it does two iodine atoms (nearly 50% of its weight) in a loose, hence most reactive, state of combination, should be well worthy of more extended trial. R. B. Billimoria obtains good results in India in the treatment of certain types of asthma, also in whooping cough, by combining the compound with other remedies.

Camphor Injection.—A solution of Camphor in olive oil, sometimes with the addition of ether is regarded as a most valuable excitant for use in the heart failure of pneumonia. It is not merely a remedy in the hour of death but it can be given with benefit throughout the entire course of various cardiac and vascular diseases. It has also recently been tried in neuritis and sciatica.

Coal Tar Derivatives.—In this chapter numerous additions and alterations occur.

Acriflavine receives lengthy consideration. The details of the Patent which is being worked under licence and the properties of this aniline dye are given. The special claim for this body is that its antiseptic potency is not interfered with by the presence of serum. On the contrary, its power is thereby enhanced. It is selective and capable of killing living bacterial protoplasm without harming the living tissue cell. Acriflavine was found to be more than 20 times more powerful against *staphylococci* than Mercuric Chloride in the presence of serum and it does not interfere with phagocytosis. Diamino-acridine derivatives are in short the most potent agents known and the property of enhanced action by serum according to C. H. Browning is shared by no other type of chemical compound hitherto investigated.

These statements do not go unchallenged. Prof. Hewlett found its action very slow—not less than 24 hours' contact with the test organism being the time employed in the experiments cited by the advocates of the compound.

A. Fleming also joined in criticism. He found that a concentration of 1 in 2000 inhibits leucocytic emigration and that 1 in 500 solution is usually unable to sterilise an equal volume of pus from a wound in 24 hours.

In spite of these criticisms Acriflavine and Proflavine which is closely allied chemically have undoubtedly gained a strong foothold as mild applications in wound treatment.

Gonorrhœa has been well treated by irrigation with dilute solutions.

Benzyl Benzoate has just recently attracted a certain amount of attention. This innocuous Benzyl ester has been used in diarrhœa and dysentery, intestinal, biliary and renal colic ; spastic constipation, vesical spasm, uterine colic, arterial spasm and for the bronchial spasm of true asthma.

Much confusion has existed as to the nomenclature of certain **Scarlet Colours** which have been used to regenerate skin and hasten epitheliation. We have endeavoured to clear up their nomenclature.

T.N.T. dermatitis is briefly described. The affection is now, let us hope, rather a matter of history.

Malachite Green especially in the form of spray in conjunction with Mercuric Chloride (Cheatle's Green Spray) gave valuable routine results as an antiseptic dressing.

Brilliant Green was found to compare very favourably with Acriflavine. Stress is laid on the importance of the dye being the sulphate rather than the oxalate and that it should be zinc-free. It has been used in conjunction with Crystal Violet (Penta- or Hexa-Methyl Violet or a mixture of both). An ointment of Brilliant-Green appears to be popular.

Of **Cocaine Substitutes,** Kerocain (British made Novocain) and Stovaine vie with each other for premier position. Personally e think that Cocaine itself as an anæsthetic has only fallen into isfavour through a few exaggerated mishaps owing to faulty technique. When some accident or untoward result occurs the drug is usually blamed. Spinal anæsthesia induced by Stovaine with a suitable addition of Glucose to increase the specific gravity of the Injection continues to be found satisfactory.

Colloidal Metals.—Untoward effects have been reported with certain colloidal copper preparations. We took occasion to have animal experiments repeated to determine the amount of toleration which may be expected by comparison in the case of the normal human being. Our pharmacologist has provided useful observations. There is no doubt that the volume of such injections whether isotonised or not constitutes an important factor as to toleration or non-toleration.

Again this colloidal metal therapy has a rather unsatisfactory scientific basis in regard to the *strength* of the solution. Going back a few years the electrically made colloids of the French might be deemed the pioneers. We ourselves followed closely with experimental work and it became a question of adjusting strength and dose of the Colloidal Metal. This we did, making the strengths 1 in 1000, 1 in 2000 and so on, according to what we deemed safe doses and we were guided also to some extent by the keeping properties—absence of precipitation on keeping. In these matters other manufacturers have followed suit.

Now our point is this—if the colloidal metals and non-metals possess relative remarkable properties stronger than the ordinary crystalloid analogues they should only be tolerated in weaker doses and concentrations than the latter. Again *per contra* if their properties are milder they could reasonably be used in bolder doses and concentrations.

Some comparative work on these lines would form an interesting study. It is unscientific to speak of " Colloidal Silver " or " Colloidal Iodine " meaning a solution or suspension of metal silver 1 in 2000 and a corresponding preparation of Iodine of strength 1 in 2000 without knowing whether a preparation for the sake of argument ten times weaker or ten times stronger would be preferable for the treatment in hand.

Let anyone, for the sake of comparison, try a nasal douche or gargle of Potassium Permanganate Solution of strength 1 in 5000 in Normal Saline—a strength which was advocated as a prophylactic against cerebro-spinal fever. The temporary discomfort caused will convince him that a preparation 10 or 20 times as strong would be, to say the least of it, intolerable. We want in like manner some comparative information as to the strengths tolerated by the mucous membrane and tissues in the case of the colloidal preparations.

Interspersed under the numerous headings we provide our Pharmacologist's reports on animal experiments with certain definite strengths of these and other colloids which we have manufactured and so far as our information goes, in actual use on man the tolerated doses with these preparations seem referable to corresponding amounts of the crystalloid compounds in each instance.

We provide new formulæ for making a Colloid Iodine Sol 1 in 2000 and a Colloid Manganese Sol 1 in 400. Gonorrhœa and its sequelæ have been treated by a Manganese preparation of this kind. Colloidal Palladium has been used in epilepsy.

Eucalyptus.—The information on Eucalyptus Oil has been completely revised and brought up to date in the light of the researches of H. G. Smith.

Ferrivine, a preparation of Iron Sulphanilate and **Intramine,** an Amino-Sulpho-Benzene have been advocated for the treatment of syphilis.

Hamamelis.—The gradual and laudable tendency to " support home industry " induced E. M. Holmes to grow *Hamamelis Virginiana* in this country, and we recently had the pleasure of distilling a gallon of Liquor Hamamelidis *Off.* from the leaves of his trees. The aroma was excellent.

Hyoscine - Morphine Anæsthesia.—Hitherto the doses and times of administration of the constituents of this treatment have created something approaching bewilderment. In the light of recent experience the ground has been cleared. Comparison of reports from hospitals shows that the method requires experience and should be withheld in all cases except where capacity for bearing pain is much below normal.

Iodine in Sterilisation of the Skin (G. L. Stretton's Method), is well spoken of. In the words of the deviser, it is excellent in abdominal surgery. Coils of intestines, etc., may rest on the skin which has been sterilised with it. Further praise is therefore not necessary.

A preparation we devised, a saturated Solution of Iodine in Liquid Paraffin, should have manifold uses—both local and internal.

Emetine by hypodermic injection for amœbic dysentery, more particularly of ' carriers ' of infection, has been superseded in great measure by **Emetine-Bismuth-Iodide** given *per os.*

It appears that Emetine as such does not kill the cystic stage of *E. histolytica.* Further, the relative failure of the hypodermic treatment of dysentery carriers is probably to be explained by the *entamœbæ* being more or less shut off from the circulation and tissue fluids of the patient. Even full courses of the alkaloid (10 to 12 grains or more) were successful in only about one third of the cases treated (C. Dobell).

Emetine-Bismuth-Iodide, however, is effective in removing cysts of the *amœba* from the fæces of chronic carriers and has cured the majority of carriers—large quantities are wanted—not less than 36 to 40 grains constituting the course, given subdivided in twelve daily doses.

We have worked a good deal on the chemistry of this body. It is a compound which may vary very greatly according to the care in manufacture. We show that, contrary to its original idea of use, the emetine contained in it is soluble in physiological acid.

Nutrimenta.—If all that is said concerning Accessory Food Factors be true, the feeding problems of the future will need reorganising. The work now being conducted at the Lister Institute has been most searching. The subdivision of these factors into ' Fat Soluble A,' ' Water Soluble B ' and ' Water Soluble C ' types and their distribution in food is very clearly brought out in a table we reproduce from a paper by J. C. Drummond.

Absence of the ' A ' factor both by animal experiment and by observance of conditions amongst the poor, where such foods as milk, butter and eggs are not markedly in evidence, has been proved to be the forerunner of malnutrition and rickets—a ' deficiency ' disease.

The total absence of *any* of the factors in lard, vegetable oils and margarine and in white bread is a serious contemplation.

The ' Water Soluble B ' factor is an old friend—its absence ha been proved to cause beri-beri.

' Water Soluble C ' is the new name for the antiscorbutic factor.

Oleum Chaulmoogræ.—In our opinion the chaulmoogra treatment of leprosy probably necessitates a saturation of the patients' system with the active constituents of the oil. So far as we know, no one has been able to state how the active principles of the oil attack the invading leprosy bacilli, but if persevered with there is evidence of curative power.

Since the last edition we have occupied ourselves with the chemistry of the fatty acids contained in the oil. We have made a Sodium Chaulmoograte 'Pure Commercial,' and have further fractionated the total fatty acids into two main portions, and converting these into their sodium salts we designate them respectively Sodium Chaulmoograte 'A' and Sodium Chaulmoograte 'C.' The primary reason of this is to provide a readily soluble Sodium Chaulmoograte (the 'C' fraction) which shall be suitable for hypodermic and intravenous use, while the remainder of the acid radicals in the form of sodium salt, while less suitable for injection into tissues, is nevertheless suitable for giving by the mouth.

Pharmacological experiments have demonstrated that the 'C' fraction even in doses of 0·2 Gm. and in strong concentration are tolerated.

Quite recently we have learnt on good authority that doses of Sodium Chaulmoograte 'A' of 0·4 Gm. given in pill form over a lengthy period are highly spoken of in a case under treatment in this country.

Papaverine.—This previously somewhat neglected alkaloid has useful analgesic properties. A dilute solution instilled through a catheter has rendered possible the removal of ureteral calculi. In other cases its use caused the passage of calculi without the aid of instruments.

Paraffin Treatment of Burns.—The 'No. 7' preparation gives satisfaction as a coating by excluding the air.

Peptone Injection in Asthma.—The asthmatic attack is thought by A. G. Auld to be a reaction on the part of the lungs to a toxic substance which gradually accumulates in the blood. Immunisation by injection of a solution of Peptone has been employed. The content of primary proteoses and in the peptone used is an important factor in adjusting doses.

Quinine.—There is little doubt that Quinine was one of the most potent of all the Allies in the war. Putting it another way, the famous war agreement of September 3rd, 1918, induced the Dutch to part with a whole year's production of Java Quinine on reasonable terms, and this secured the future destiny of the civilised world.

The treatment of malaria and relapses during the past few years of war conditions must have caused our Army Medical Department grave anxiety. We recall a conversation with a private who had been in 'Central Europe,' and who on returning home had numerous relapses. He said his general had made frequent boasts that he had not used his reserves. According to our private he couldn't, because they were all sick with malaria!

An investigation of treatment of relapses under direction of Sir Ronald Ross crystallises discussions which have been proceeding for years right up to the present time.

It is satisfactory to see that preference is now given almost entirely to the Acid Hydrochloride. Massive doses can be given with this salt with impunity by reason of its extreme solubility and of the fact that it tolerates sterilisation without fear of decomposition in any way. Occasionally it is true one hears of large intramuscular injections giving untoward result.

We classify our information under the headings, 'RESULTS OF EXPERIENCE IN THE WAR IN MALARIA,' 'RELAPSES,' 'PROPHYLACTIC USE,' and 'MALARIA IN ENGLAND.' These headings appear under Quinine Sulphate. For internal use this salt is still the most used —some go so far as to *prefer* it because it dissolves *slowly*, but the general view is that it should be given with a little acid in solution. Many medical men with vast experience in the tropics have contributed their opinions to scientific journals, and the abstracts which we have made will therefore repay careful study.

The claims for **Quinoidine,** the name given to a mixture of alkaloids in the mother liquor after the crystalline alkaloids have been removed, seem quite justified by the reports of its use in India.

The praises of **Hypertonic Saline** have been so well sung in the pages of medical journals that further tributes seem uncalled for. We provide an accurate account of the treatment and of salt packs, etc. Those who acclaim this wound treatment go so far as to say they have not come across any satisfactory evidence, bacteriological or clinical, of the utility of antiseptics as employed in infected wounds. It appears incidentally that 2% of salt inhibits and 5% completely arrests the growth of pyogenic organisms, also that, though in theory the method is excellent, in practice results varied. The strong solution is extremely irritating. Salt used to be rubbed into wounds made by the lash—*not* for its healing power.

Sphagnum.—For many years past we have advocated the use of Turf Moss as an absorbent dressing for imbibing discharge of almost every description. Latterly the writer has been much engaged in pressing the moss into sheet form to produce a cheap and handy form of surgical dressing. Numerous surgeons, notably C. W. Cathcart, favour it. Vast quantities were used during the war. The sterilisation and sublimation of the dressing have received our careful consideration, but it is much more expeditious to wring out the dressing in a little diluted Lysol just prior to use. For certain purposes this treatment is not required—the sheet can be placed under bed linen just as it is.

Thorium Compounds receive an interesting addition in the shape of Thorium-Sodium Citrate Solution, which can be used as a pyelographic medium in considerable strength equivalent to 10 and 15% of Thorium Nitrate.

In the **Supplementary List of Drugs,** the following in particular call for mention :—

Gum Acacia Solution for Intravenous Injection to raise blood pressure after loss of blood whether from wounds or surgical shock.

Allium preparations in the treatment of wounds, duodenal ulcer, and in whooping cough.

Erodium Cicutarium as a succedaneum to hydrastis.

Mastich Varnishes for embalmment of wounds.

Croton Elliottianus Oil.—This is to be distinguished from Croton Oil *Off.* It will be well to term this new oil 'Oleum Elliott' to prevent error. Prof. Cash, in conjunction with W. J. Dilling, have submitted the seeds and the oil from them, obtained from trees growing in British East Africa, to an exhaustive study as to their physiological action (Jl. Pharm. & Exptl. Therapeutics, Nov. 1914). The oil does not contain the acrid vesicating resins occurring in the Oil of *Croton Tiglium.*

The Oil, taken in dose of 0·04 to 0·06 Cc. (2/3 to1 minim) is mildly laxative and moderately purgative, while 0·1 Cc. (1½ minims) is a vigorous and rapid purgative. It is peculiarly free from undesirable effect on the stomach or viscera. Applied locally to the skin it does not irritate. This is of importance; compare the action of *Croton Tiglium* Oil. Human experiments have in no case resulted in intestinal inflammatory action.

The relatively non-irritant action of the oil, its safe and certain effect, whether as laxative in 8 to 10 hours, or in large dose as a speedy purgative, its high potency in relation to the small bulk of the dose, makes it a valuable addition to purgative remedies. The effects in general are entirely different from the drastic action of *Croton Tiglium* Oil and as a product of our Indian Empire 'Oleum Elliott' deserves adequate consideration.

A subject which has engaged our attention on this occasion is the provision of **working formulæ for preparing various Organic Chemical Compounds.** Many of these are the subjects of British patents the rights in which have ceased for various reasons, for example (1) because they have been annulled under the 1907 Act, *i.e.*, on the grounds that the substance has not been manufactured in this country, or (2) because the patents in question have lapsed by time.

It is well known that the information provided in many of these Patent Specifications is of a purposely misleading nature. Prof. Thorpe who, early in the war, worked out the process of making Benzamine, went so far as to say a German patent was the outcome of close co-operation between astute lawyers and skilful chemists, and was a means to deceive. A research chemist would have to work for a considerable time before he could realise that he was in a scientific *cul-de-sac.*

A study of many of these Specifications and the 'examples' of working which are provided as appendices, are often veritably amusing in their purposeful intention to mislead, and one can only marvel that the subject matter in these instances has passed as suitable matter for patents. There would seem to have bee grave lack of control or investigation prior to their final specification stage. For example, anyone wishing to make Salipyrin (Antipyrin Salicylate) would surely do better to warm molecular proportions of the two components on the water bath—it crystallises in beautiful plates—than to "heat under pressure at 160 to 180° C. a mixture of Phenyl-hydrazin, Aceto-acetic Ether, Methyl Salicylate, Hydriodic Acid and Methyl Alcohol."

Then, again, some of the inventions are of such a simple nature that they could hardly be deemed novel or worthy of the granting of British Letters Patent.

We came to the conclusion that information as to just *how* to proceed, where to deviate from the patent specification, what pitfalls to avoid, and in short the provision of valuable 'tips' would be of great interest to our readers at the present time. We therefore went systematically through our pages and set to work to put to the proof these printed details, and where found wrong to provide reasonable help for the benefit of our readers.

We wish to make it clear to our friends that these instructions do not lay claim to being the last words on the matters in question—they are the results of laboratory trials, some on a fair scale, others on a tentative scale only. Where we have failed we say so, and we must try again at a later date. Even in times of peace the undertaking would have been both arduous and expensive, but in the current conditions the conduct of the experiments has been proportionally more difficult.

We welcome criticism, and any information which our manufacturing friends have at their disposal to augment the data we provide, or on compounds which we have not yet dealt with, may be sent to us for use in subsequent editions of the book—it being understood that the information in question which we shall acknowledge will be issued for the general good.

A glance through our pages will show *new* information (in addition to what was in the last edition) of this description, for example under the following headings :—

Acetyl-p-amido-Salol,
Albumin Tannate,
Aluminium Naphthol Sulphonate,
Amidopyrin,*
Amylene and Amylene Hydrate,*
Anesthone,
Antimony Sodium Tartrate,
Argentum Proteinicum,*
Aristoquinine,
Aspirin,*
Barbitone and Sodium Diethyl Barbiturate,
Benzonaphthol,
Benzyl Benzoate,
Betol,
Bismuth Oxy-iodogallate,
Bismuth Subgallate,
Borneol Valerianate,
Chloralamide,
Chloramine-T,
Desoxycholic Acid,*
Diaminothiobenzine,
Emetine Bismuth-Iodide,
Ethyl-Morphine Hydrochloride, *
Eugallol,
Guaiacol Benzoate,
Guaiacol Carbonate,*
Hexamine,
Hippuric Acid,
Hydroquinone,
Hydroxylamine,
Ichthosulphol Proteinate,
Ichthosulphol Formalin,
Iron Cacodylate,
Laevulose,
Lenigallol,
Lysol made with Soda,
Magnesium Aceto-Salicylate,
Menthyl Valerianate,
Mercury Succinimide,
Methyl Atropine Nitrate,
Methylamino oxybenzoate,
Naphthalene Tetrachloride,
Naphthol Bismuth,

Nitroglycerin,
Oxyquinoline Sulphate,
Paraformic Aldehyde,
Phenolphthalein Valerianate,
Piperazin,*
Quinine Ethyl Carbonate,
Resorcin,*
Resorcin Acetate,
Salacetol,
Salipyrin,
Sanatogen,*
Santalol Salicylate,*
Silver Gelatose,
Sodium Chaulmoograte,
Theophylline,
Thiosinamin,
Thymol Iodide,
Tribromphenol-Bismuth.

Those marked with star have not been actually made by us, but we believe the information we give in these cases is trustworthy. We think it may be claimed that the results of experimental research on these important problems are not available in any other work of the kind.

We would record our indebtedness to the late Harry Johnson, Ph. Ch., who worked upon many of these compounds under our direction.

We now come to another aspect of expired Patents, which is only understood by relatively few medical men.

It was the custom of the foreign manufacturer to simultaneously register a Trade Mark consisting of a name—an invented word for the substance for which Letters Patent had been granted. The Patent Rights in the vast majority of cases extend over 14 years and then expire entirely—the name of the article therefore has been used to perpetuate the monopoly.

The position is that 'when an article has been introduced as new (we quote from S. W. Woolley, Editor of the "Chemist and Druggist," *c.f.* page 955, who has done such excellent service in showing up the anomaly), and has been first made under a patent, the name by which it is known becomes common property as soon as the expiration of the patent puts an end to the monopoly in the manufacture and sale of the article, and although the name may, up to that time, have identified the goods with the maker of them, it is no longer available for him as a Trade Mark or Trade Name.'

A Trade Mark in the ordinary course can be continued indefinitely, by renewal every 14 years and when it is realised that renewals of Trade Marks applied to patented articles are made after the expiry of the patent, the extent of the monopoly created is clearly infinite.

An excellent temporary measure was enacted entitled the ***Patents, Designs and Trade Marks (Temporary Rules) Act, 1914,*** with amendment which we give *in precis*, p. 956. This Act gave powers to the Board of Trade to 'avoid' or 'suspend' any patent or to grant licences to use patents belonging to enemy proprietors, also to avoid or suspend the registration of enemy Trade Marks. The distinction between the official '*avoiding*' and '*suspending*' we explain (*ibid.*)

The "Chemist and Druggist" has been indefatigable in providing lists of familiar names of chemical products of this type in respect of which monopolies had been granted by Letters Patent now expired, but which had been further protected by Trade Marks, the renewal fees of the Trade Marks being paid in many cases years after the Patents had expired.

The provisions of a new moderate Act, the 1919 Trade Marks Act, are given on p. 958. These will go far to prevent injurious monopolies in the future, but cannot remedy the evils of the past.

Throughout our pages under the individual headings we have given a careful digest of the position of Patents and Trade Marks as affecting the individual chemical compounds. We have shown in what cases avoidance or suspension with granting of licences have been effected, and while consulting the Register at the Patent Office, have thought well to append the Registered Number to every trade mark. This will be a convenience to those wishing to undertake further investigation (*c.f.* p. 955). It should be added that the records at the Patent Office are not completely up-to-date. In many cases renewal fees have been paid up by agents for foreign firms during the war. In others, again, there appeared to exist a state of suspended animation.

The view might be expressed that no great harm would be done by officially avoiding or confiscating and making public a vast number of German owned Trade Marks and their corresponding Patents, many of which became household words before the war.

Vaccines and Serums.—This section has also been very thoroughly revised in the light of the latest knowledge of the subject.

One of the most recent developments is the introduction of DETOXICATED VACCINES. D. Thomson, as the result of experimental research, has hit upon the idea of treating bacteria, *e.g.*, the *gonococcus*, with an alkaline solvent, by which the bacterial protoplasm and the toxic endotoxin are dissolved. On treatment with acid or an acid salt, the stroma is again precipitated, leaving the toxin in solution—the latter is rejected and the bacterial substance, after washing and suspending in suitable slightly acid medium, is used therapeutically.

The treatment of combined infections, such as the common cold and influenza, with Stock Vaccines in which the bacterial flora varies from time to time, requires watchfulness and a constant readjustment of the constituent organisms to suit prevailing epidemics. Autogenous Vaccines in these and many other infections offer greater hopes by reason of their complete specificity. It is noted that experts in vaccine therapy are now bolder in their doses, both in regard to treatment of existing infection and in prophylactic measures.

Numerous abstracts are given from important papers on CEREBRO-SPINAL FEVER. Epidemics of this were exceedingly troublesome in camps at the commencement of the war. Diagnosis by means of swabbings taken from the throat permits of treatment of carriers with antiseptic sprays of various formulæ. An Antimeningococcic Serum made in this country given at the earliest possible moment was very successful.

Cholera inflicted great loss upon our enemies. The Turks and Austrians suffered incredible losses from it. Double inoculation (against Cholera and Typhoid) and even tetra-and penta-and hexa-vaccinations (Castellani), became matters of expediency in protecting troops.

Diphtheria Antitoxin has been improved by a method of purification resulting in the production of a 'concentrated' form. That of the U.S.P. has the same dose and potency as the ordinary Serum Antidiphthericum, but the purification effected by removal of the unrequired serum albumen may reduce the untoward serum rashes which frequently occur with the older type.

Dysentery.—Bacillary Dysentery was markedly to the fore in the campaigns in many parts of Central Europe. In the Salonika Forces the bacillary type constituted 95%, while the amœbic was less than 3%. In a Mesopotamia Stationary Hospital, out of 608 cases of dysentery, 341 were proved to be bacillary or regarded as such, while 140 were proved to be amœbic. Antidysenteric Serum intravenously gave the best results. The late H. Graeme Gibson's Sensitised Vaccine gave much promise.

Men who are carriers of *Flexner's Bacillus* and *Shiga's Bacillus*, according to a recent Medical Research Committee Report, have unfortunately a poor immediate outlook of regaining health and strength.

Amœbic Dysentery has been referred to under Emetine.

Detoxicated Gonococcic Vaccine of D. Thomson has already been mentioned. It permits of relatively enormous dosage in comparison with the ordinary vaccine. It is stated there is less tendency to relapse after inoculation so common after other methods of treatment, as the patient has circulating in his blood for several months sufficient anti-substance to protect him.

In regard to Influenza, the War Office Conference deliberations under the chairmanship of Sir W. B. Leishman, and the criticisms levelled against their recommendations, notably with regard to deficiency in and dosage of *Influenza Bacilli* and *pneumococci* are given in detail.

It is stated on high authority that the use of vaccines to control epidemic catarrhs is doubtful, but that the prevention of pneumonia by this means is more hopeful. Pfeiffer's Bacillus is generally acknowledged to be the real cause of the disease, but there is a possibility that the presence of an ultra-microscopic organism underlies all the phenomena.

Pneumonia.—Prophylactic inoculations with small doses of *pneumococci*, *streptococci*, and *B. influenzæ* gave W. H. Wynn useful results in the case of the staff of a public institution in the 1918 epidemic.

The natives in South Africa (workers on the Rand Mines) possess an extraordinary susceptibility to the *pneumococcus*, and require high doses for immunisation. F. S. Lister has made recommendations on the subject. This worker now differentiates a dozen types of pneumococci.

For white races the work of investigators of the Rockefeller Institute shows that initial doses of 1,000 millions of each of the prevalent strains can be safely used. It is noteworthy that the Indians have also a low resistance to pneumonic infection, and the appalling death-rate in 1918, when not fewer than 4,899,000 persons died of influenza and its complications is a terrible contemplation.

As pneumonia unfortunately so often supervenes on influenza, the chapter on the last-mentioned should be read in conjunction.

TETANUS.—The recommendations of the Lister Institute are provided firstly as to the large doses of Antitoxin to be given in an actual case, and secondly as to its prophylactic use and the treatment of the wound. 500 to 1,000 U.S.A. units is a sufficient prophylactic dose in the majority of cases. Here, again, advice of the War Office Committee Memorandum is an important addition.

TUBERCULOSIS.—An exceedingly interesting paper on Hospitals for Treatment of Tuberculosis, by H. Batty Shaw, is given in abstract (see pp. 881 and 882). The Insurance Act method of dealing with tuberculosis is believed to have failed. Observation Hospitals are needed for doubtful cases, as also Invalid Homes—these may be in populous centres, where those suffering from pulmonary tuberculosis, and who are rendered incapable thereby, may be nursed and treated until they are fit to earn their living—if this be possible.

Tuberculins.—It has been said that no less than 200 different tuberculins have been introduced since Koch made his first preparation. The subject became amazingly complex, and perhaps the 'clean sweep' which the war has effected will be for good.

To replace the 'T.R.' of Koch R. W. Allen has produced a preparation termed Tuberculin 'M.' This is devoid of toxicity but capable of provoking definite focal reaction and exciting the formation of adequate antibodies when given in sufficient dose.

The preparations remaining in our pages and to which predominance is given, are therefore Old Tuberculin, Albumose-Free Tuberculin, Tuberculin 'M,' Bacillary Emulsion, and Beranek's Tuberculin.

The whole subject has been practically re-written.

We continue to differentiate between the 'English dose' and the bold dosage of the German School—the latter with the marked rises in temperature produced is, however, little used now.

TYPHOID.—The outstanding feature in the case of Typhoid Vaccination is the recognition of the para-typhoid 'A' and 'B' factors in immunising. The overwhelming preponderance of para-typhoid was, for example, clearly shown by W. H. Willcox who found in the Dardanelles area in his experience that while typhoid cases were 13·5%, para-typhoid constituted 86·5%. It is fortunate that the virulence of the para-typhoid organisms is much lower than that of *B. Typhosus* or thousands of lives would have been thrown away.

'**T.A.B. Vaccine**' has become, therefore, a recognised immunising agent. The constituents of Castellani's Multiple Vaccines follow this—on page 901. This authority's tetra- and penta- vaccines have been successfully used. The hexa-vaccine, if found efficient, would be the ideal vaccine for use in the tropics.

In the **Organotherapy Section** the chapter which has required most revision is that concerning the Pituitary Gland. All portions of the gland are now used. There is reason to believe that the *entire* gland may be given with advantage to improve metabolism, raise arterial tension and improve appetite.

Further, the *anterior* lobe may be used alone—it is thought to exercise a stimulating effect upon growth, and finally there is the *posterior* lobe, which in the form of Liquid Extract promotes contraction of unstriped muscle fibre.

A well-known physiological expert has at our request reported in detail upon preparations of this extract made in the author's laboratories.

In practice it may be said that 'suffering of the patient is lessened and risk of post-partum hæmorrhage diminished,' but the injection must not be given too early. Those who have not had occasion to use pituitary may do well to study the advice collected from papers of numerous obstetricians.

Under **Thyroid Gland** we include a note on Thyroxin, an iodine containing active constituent. It has recently attracted much attention by the work of J. Huxley.

The *Table of Infectious Diseases* giving incubation, quarantine and isolation periods, has been brought up-to-date.

The chapter on **Poisons** at the end of the book embodies most carefully all the recent Enactments.

The *Cocaine and Opium Regulation* of 1916 superimposes regulations on dealings in Cocaine—clearly not without need in the light of recent events. Medical men for their own sakes should make themselves *au fait* with all the requirements. We have something to say on the desirability of foreseeing malpractices with Cocaine *Substitutes* which are quite as readily available to the public—indeed, more so because they are not scheduled poisons at all.

The *Narcotic Drugs Order* regulating the supply of hypnotics to members of H.M. Forces, which followed closely upon the Cocaine and Opium prohibition, could be regarded as a war measure, and be shortly, let us hope, abolished altogether.

In the *Schedule of Poisons,* note the transference of Diethyl-barbituric Acid and its derivatives to Part I. and the inclusion of Lead Oleate (Diachylon).

The paragraph on *Poisons through the Post* is worthy of the attention of medical men who are unfortunately not over careful in their requests.

The vexed question of 'Cocaine in Dentistry' at the time of writing leaves the 'unregistered dentist *bona fide* engaged on

July 28th, 1916, in practising dentistry' an unchallenged user of Cocaine preparations of a certain strength.

A Committee to enquire into the extent and gravity of the evils of Dental Practice by persons not qualified under the Dentists' Act has made its report.

The Venereal Diseases Act, 1917, is given in sufficient abstract.

A great deal of very useful therapy has been added under the individual headings of diseases and affections in the *Therapeutic Index.* It includes a fairly comprehensive **Résumé of Antiseptics** used in wound Treatment. *See* Wounds.

We have in the course of revision added to this volume several thousand general references to scientific literature.

To revert again to our few opening paragraphs, it might be argued that the matters there discussed do not appertain to the pages of the "Extra Pharmacopœia." We must, we fear, differ. It is so seldom that patriotic enterprise receives anything more than a half-hearted smile by way of encouragement that we are glad to join hands with the few—the minority—who are not held back by reticence.

We mentioned that the lack of education was a lesson of the war. Good papers appear from time to time on education. Each writer holds his own ideas, and candidly our view is that to teach our University men how and what to teach is in a great measure presumption on the layman's part.

There is a subject, however, which we would like to see thoroughly dealt with. The science of Bacteriology should be all important to the young pharmacist. If not as a recognised subject of examination, a post-graduate course should be open both to the chemist and druggist, and the pharmaceutical chemist, which would qualify him to do bacteriological work for the medical man. We are glad to note a recent movement in this direction under official guidance.

The conduct of what may be called war therapy during the last five years cannot fail to bear fruit in the more leisured times of peace. The rough and ready 'C.C.S.' methods have undoubtedly attendant advantages.

The experience gained by many medical men while working close up to the lines under pressure will be worth more to them and the students they teach than the slavish copying of German professors' dogma, however brilliant, in time gone by. It will not be a case of 'Ehrlich said at the Medical Congress the ratio of the *dosis curativa* to the *dosis maxima tolerata* was—,' or that 'Distilled Water must be *sterilisata* six or seven times over prior to use!' It will be, 'I remember the case of a Tommy who had lain out in no man's land—,' and so on.

Some time ago we were asking a well-known Professor in Organic Chemistry at a British University for some assistance in a problem which had attracted attention in Germany. We questioned him at the conclusion of our visit as to his reason for such intense interest in these matters. He replied that he found them more interesting than golf!

It is well for British industry that there are such men. In a recent letter he says that he is *overworking* himself with an 'accumulation of students since the war.'

In our opinion the oft-quoted lines of another worker for England could be slightly altered to apply also to these patriots who work at home :—

> If I should die, think only this of me :
> That there's some corner of a foreign field
> That is for ever England. There shall be
> In that rich earth a richer dust concealed;
> A dust whom England bore, shaped, made aware,
> Gave, once, her flowers to love, her ways to roam;
> A body of England's, breathing English air,
> Washed by the rivers, blest by suns of home.—*Rupert Brooke*.

W. HARRISON MARTINDALE.
W. WYNN WESTCOTT.

London, June, 1920.

INTRODUCTION.

Herein medicines are viewed from a pharmaceutical and medical aspect; references to their use, with the doses employed, are given in *precis*. The area of selection is limited by personal experience. The **Doses** of chemicals and drugs are based on personal knowledge, or are culled from the best authorities. The terms *Drachm* and *Ounce*, when applied to liquids are understood to be the Fluid Drachm and Fluid Ounce respectively, as officially recognised, and employed throughout the British Empire. The British Pharmacopœia (1914) recommends prescribers to cease to employ the *symbols* ʒ and ℥ and gives far greater preference to the Metric System, both in regard to compounding and dosage. We deal with this matter further under Weights and Measures. Except in some foreign formulæ, where liquids are ordered to be weighed, when parts are referred to (solubilities included), it is to be understood that grammes and cubic centimetres, or ounces and fluid ounces, or grains and grain-measures are to be employed. In regard to the formulæ for hypodermic injections and several others, as a minim is not equal to a grain-measure, and as hypodermic syringes and dispensing measures are graduated in minims, for practical purposes the use of ‘ parts ’ is generally avoided when referring to these small quantities. They are, therefore, ordered in grains and minims or ounces (i.e., fluid ounces); thus Injectio Morphinæ Acetatis Hypodermica contains 1 grain of Morphine Acetate in 6 minims. Exceptions to this rule are clearly indicated.

Where **Percentage Solutions** are mentioned, it is intended that 100 Cc. shall contain *n* Gm. or that 100 grain-measures of the finished solution shall contain *n* grains of the substance, *e.g.*, a 50 per cent. solution of Cocaine Hydrochloride will contain 50 Gm. in 100 Cc. or 50 grains in 100 grain-measures. For **Conversion Table,** *v.*p. xxxv.

ABBREVIATIONS.

When the reference is to a periodical, the number put first is the number of the volume; then follow the last two figures of the year, and the last number refers to the page, thus, B.M.J. i./20,500.

Allen.—Allen's Commercial Organic Analysis—Edited by H. Leffmann, M.A., M.D., W. A. Davis, B.Sc., A.C.G.I., and S. S. Sadtler, S.B., 1909–1917, 9 vols.

Allen, R. W.—Vaccine Therapy. Its Theory and Practice, R. W. Allen, M.D., B.S., 4th Edition, 1912; Bacterial Diseases of the Respiratory Tract and Vaccines in their Treatment, 1913; also Practical Vaccine Treatment, 1919.

Am.Jl.Ph.—American Journal of Pharmacy.

Batty Shaw—Organotherapy, or Treatment by means of preparations of Various Organs, H. Batty Shaw, M.D., F.R.C.P., 1905.

Beddoes.—Syphilis, Its Diagnosis, Prognosis, Prevention and Treatment, T. P. Beddoes, 1909.

B.Pt.—Boiling Point.

B. & C.P.—British and Colonial Pharmacist, London, previously B. & C.D.—British and Colonial Druggist.

B.M.J.—British Medical Journal, London.

B.M.J.E.—British Medical Journal Epitome.

Berl. Klin. Woch.—Berliner Klinische Wochenschrift, Organ für praktische Aerzte, Berlin.

Bosanquet.—Serums, Vaccines and Toxins in treatment and diagnosis, W. Cecil Bosanquet, M.D., 3rd Edition, 1916.

B.P.C.—British Pharmaceutical Codex, 1911, and Supplement, 1915; B.P.C. 1894 or 1901—Formulary of the British Pharm. Conference. B.P.C. Supp. 1908,—Supplement to 1907.

Brickdale.—J. M. Fortescue-Brickdale, M.A., M.D., Guide to Newer Remedies, 1910.

Brompton H.—Pharm. Brompton Hospital, 1899.

Brooke.—Gilbert E. Brooke, Tropical Medicine, Hygiene and Parasitology 1908.

Brunton.—Text-Book of Pharmacology, Therapeutics, and Materia Medica, by Sir T. Lauder Brunton, M.D., 3rd Edition, 1891; also Therapeutics of the Circulation, 2nd Edition, 1914.

Can. Form.—The Canadian Formulary of Unofficial Preparations.

Caspari.—Pharmacy for Students and Pharmacists, C. Caspari, jun., 1906 and (4th Edition), 1910.

C.D.—Chemist and Druggist, London.

C.H.W.—Formulæ of Chelsea Hospital for Women, 1900.

C.L.T.E.—Central London Throat and Ear Hosp. Pharm., 1901.

Chem. News.—Chemical News, London.

Clin. Jl.—Clinical Journal.

Colyer's Dental Surgery and Pathology:—3rd Edition, 1910, and 4th Edition, 1919 (previously Smale & Colyer's Diseases and Injuries of Teeth).

Comptes Rend.—Comptes Rendus Hebdomadaries des Séances de L'Académie des Sciences.

C.R.—Proposed changes in the British Pharmacopœia, in accordance with the International Agreement for the Unification of Pharmacopœial Formulas for Potent Drugs signed at Brussels, Nov. 29, 1906, from a report to the Pharmacopœia Committee of the General Medical Council. Adopted by the Committee of Reference in Pharmacy, March 4, 1907. This Committee issued further reports in 1908, 1910, 1911. *c.f.* Edition XV., p. xxiv.

C.X.—Charing Cross Hospital Pharm., 1917.

Cushny.—Text Book of Pharmacology and Therapeutics, Arthur R. Cushny, M.A., M.D., F.R.S., 7th Edition. 1918.

Dawson Turner.—Radium, its Physics and Therapeutics, by Dawson Turner, B.A., M.D., 2nd Edition, 1913.

D.M.W.—Deutsche Medizinische Wochenschrift. Leipzig.

Digitalis Assay.—W. H. Martindale. A communication to the Pharmaceutical Society of Great Britain, 1913. (London : H. K. Lewis & Co. Ltd.)
Disp.—Art of Dispensing, Peter MacEwan, F.C.S., Ph. Ch., 9th Edition, 1912.
E.L.—Pharm. of East London Hospital for Children, 1903.
E.—Pharm. of Evelina Hospital, Southwark, 1906.
Ed.M.J.—Edinburgh Medical Journal.
Edition XVI.—Sixteenth Edition of this work (1915). For References and comments unavoidably deleted.
Emery.—Clinical Bacteriology and Hæmatology, W. D'Este Emery, M.D., B.Sc., 5th Edition, 1917.
E.P.I.—Economic Products of India, 1889–96.
F.E.—Farmacopea Española Septima Edicion, 1905. Madrid.
F.I.—Formula Internationalis, International Agreement for Unification of Formulas signed 1906—*c.f.* C.R. *antea*.
F.N.—Formulaire des Medicaments Nouveaux. Bocquillon-Limousin, 23rd Ed., 1911, and previous Editions. Paris
F. Norsk.—Den Norske Farmakopϕ, 1913. Norwegian Pharmacopœia.
Fr. Cx.—Codex Medicamentarius Gallicus, Pharmacopée Française. Paris, 1908, Masson et-Cie, 120, Boulevard Saint Germain.
G.—The Essentials of Materia Medica and Therapeutics—Sir A. E Garrod, M.D., and Sir N. J. C. Tirard, M.D., 13th Edition, 1890.
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* In connection with a text heading signifies that the name which it precedes is a British Registered Trade Mark, *e.g.*, *Exalgine. The * is only applied to the principal heading and is not repeated throughout the book. The Registered Numbers are now added in brackets.

WEIGHTS AND MEASURES.

The British Pharmacopœia (1914) employs the Metric System for pharmaceutical and anaytical purposes, but for doses retains the dual system of weights and measures adopted in 1898, namely, the Metric and Imperial Weights and Measures. A preparation made according to either system will contain approximately the same proportions of ingredients.

The temperature 16·7° C. (62° F.) is employed for measuring vessels used in the **Imperial System**—this applies to *doses* only so far as the B.P. is concerned. The temperature in question is authorised by the Weights and Measures Act, 1879. For determining **Specific Gravities** the temperature 15·5° C. (60° F.), is used in the British Pharmacopœia (U.S.P. employs mostly 25° C.).

The Board of Trade, May 1, 1908, recognised, as stated in the British Pharmacopœia, the word 'mil' as a short official designation for the millilitre, 'decimil' for $\frac{1}{10}$ of a millilitre, and 'centimil' for $\frac{1}{100}$ of a millilitre. These terms are used in stating 'metric' doses in the British Pharmacopœia, but in paragraphs relating to Analysis and in those relating to the manufacture of galenicals preparations the term 'millilitre' is (officially) employed.

In the Extra Pharmacopœia formulæ are given in 'proportional parts,' solids by weight, and liquids by *measure*, as the dispensing of liquids in Great Britain is always conducted by measuring. Exceptions to this rule are always made clear in the text. In those, therefore, in which 'proportional parts' are used, the quantities of solids and liquids may be taken respectively in grammes and cubic centimetres, ounces and fluid ounces, grains and (to be strictly accurate) grain measures, but minims in place of the latter will often be used, and only cause one-eleventh *minus* error.

In the body of the work (but not in the secondary List or Index) the approximate doses of each drug and preparation in terms of the metric system follow those of the Imperial System. For all practical purposes, a fluid drachm may be considered as 4 cubic centimetres; 60 grains as 4 grammes; the avoirdupois ounce (about 28⅓ grammes) may be taken as 30 grammes; the fluid ounce as 30 cubic centimetres; and the pound avoirdupois as half a kilogramme (approximately it is nine-twentieths).

In using the metric system, prescribers may consider the British grain as 60 milligrammes (nearer 0·065 Gm.), 1½ grains as 0·1 Gm., and 15 minims (nearer 17 minims) as approximately 1 cubic centimetre. (See table, pp. xxii. and xxxiv.). *Note.*—The U.S.P. also makes 15 minims equivalent to the Cc.

The following approximations will also be useful :—

80 minims = 5 Cc.* = 1 teaspoon.
240 minims = 15 Cc * = 3 teaspoons. 1 tablespoon.
960 minims = 60 Cc. = 12 teaspoons. 4 tablespoons. 1 wineglass.
250 Cc. = 50 teaspoons = 16 tablespoons (about), 4 wineglasses. 1 tumbler.

The word gramme (preferably shortened to **Gram for British Use**), is contracted to **Gm.**, and the words cubic centimetre to **Cc.** The contraction **Gm.** in heavy type and with a capital initial letter distinguishes it from gr., the usual (though dangerous) contraction for grain. The latter is only used in the index for sake of brevity.

At the International Agreement respecting the Unification of Pharmacopœial Formulas for Potent Drugs signed at Brussels on Nov. 29, 1906, it was agreed that the normal **Drop Measure** officially recognised shall have an external diameter of 3 mm., and give (at the temperature of 15° C.) 20 drops of distilled water per Gm.

For Analytical work this International drop is now *Off*. recognised. It is stated that at 15·5° C. 20 drops of water from the drop measure are equivalent to 1 millilitre.

We provide in Vol. II., a Drop Measure Table based on that in the Farmacopea Oficial Española, 1905. The French Codex also gives a very complete Table of this description.

The sizes of bottles in most frequent use in France are :—

1,000, 500, 250, 200, 125, 100, 50, and 25 cubic centimetres.

Mixtures may be prescribed in 125, 200, or 250 Cc., or where it is desired to prolong the treatment 500 Cc. is a convenient size ; and drops should be ordered in quantities of 60, 30, and 15 Cc.

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METRIC WEIGHTS AND MEASURES AND THEIR EQUIVALENTS.

1 Gramme (or Gram) (Gm.) .. .. = 15·4323564 grains.
1 Centigramme (Cgm.) .. .. .. = 0·154323 grain.
1 Milligramme (Mgm.) .. .. .. = 0·015432 grain.
1 Litre .. .. = 35·196 fluid ounces.
1 Cubic Centimetre (Cc.) .. .. .. = 16·95 minims (nearly).
1 Metre .. .. = 39·370113 inches.

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* These quantities are respectively those recognised by the Fr. Cx. for a coffee spoonful (teaspoonful) and a tablespoonful (Cuillerée à Soupe).

According to the P. Belg.—

La cuillerée à café holds 4 Gm. of water.
La cuillerée à dessert holds 10 Gm. of water } as also in Fr. Cx.
La cuillerée à bouche ou à Soupe holds 15 Gm. of water.

Generally speaking.—

One teaspoon = 4 Cc.
One dessertspoon = 8 Cc.
One tablespoon = 15 to 16 Cc.

The Gramme has its decimal multiples—Dekagramme, Hectogramme, and Kilogramme; and divisions—Decigramme, Centigramme, and Milligramme. The Litre and Metre have their corresponding decimal divisions—Decilitre, Centilitre, and Millilitre,—and Decimetre, Centimetre, and Millimetre.

In Continental States, where this system is now generally adopted for the dispensing and preparing of medicines, all liquids are weighed, and the terms Gramme, Centigramme, and Kilogramme only are used. This avoids the possibility of errors, which the similarity of the names Decagramme and Decigramme might lead to, but if the Greek prefix *deka* were always spelt with a *K* this possibility of error would not exist.

Furthermore, the quantities of the ingredients in prescriptions are ometimes written in decimal proportions, the gramme being understoodto be the unit; the name of the integer is generally not mentioned, thus:

Rhubarb 35· means 35 grammes of Rhubarb
,, ·035 ,, 35 milligrammes

The following abbreviations are officially used in all French educational establishments:—

Myriamétre, mam
Kilométre, km
Héctométre, hm
Dékamétre, dam
Métre, m
Decimétre, dm
Centimétre, cm
Millimétre, mm
Dékastére, das
Stére, s or m^3.

Décistére, ds
tonne, t
Quintal métrique, q
Kilogramme, kg
Hectogramme, hg
Dékagramme, dag
Gramme, g
Décigramme, dg
Centigramme, cg
Milligramme, mg.

Kilolitre, kl
Hectolitre, hl
Dékalitre, dal
Litre, l
Décilitre, dl
Centilitre, cl
Millilitre, ml
Hectare, ha
Are, a
Centiare, ca or m^2

APPROXIMATE EQUIVALENT DOSES.

WEIGHTS. IMPERIAL TO METRIC.

grain	Gm.	grain	Gm.	grains	Gm.
$\frac{1}{1000}$	= 0·000065	$\frac{1}{4}$	= 0·016	15	= 1·0
$\frac{1}{200}$	= 0·0003	$\frac{1}{3}$	= 0·02	20	= 1·2
$\frac{1}{100}$	= 0·0006	$\frac{1}{2}$	= 0·03	30	= 2·0
$\frac{1}{64}$	= 0·001	$\frac{3}{4}$	= 0·05	45	= 3·0
$\frac{1}{50}$	= 0·0013	1	= 0·06	60	= 4·0
$\frac{1}{40}$	= 0·0015	grains		90	= 6·0
$\frac{1}{32}$	= 0·002	1½	= 0·1	120	= 8·0
$\frac{1}{25}$	= 0·0025	2	= 0·12	150	=10·0
$\frac{1}{20}$	= 0·003	3	= 0·2	180	=12·0
$\frac{1}{16}$	= 0·004	4	= 0·25	½ ounce	
$\frac{1}{12}$	= 0·005	5	= 0·3	(av.)	=15·0
$\frac{1}{10}$	= 0·006	6	= 0·4	1 ,,	=30·0
$\frac{1}{8}$	= 0·008	8	= 0·5	(or nearer 28·35.	
$\frac{1}{6}$	= 0·01	10	= 0·6	1 pound	
$\frac{1}{5}$	= 0·012	12	= 0·8		=453·59

WEIGHTS METRIC TO IMPERIAL.

1 kilogramme	= 2lb. 3¼ oz.
500 Gm.	= 1 ,, 1⅝ ,,
100 ,, ...	= 3½ oz.
25 ,, ...	= ⅞ ,,
10 ,, ...	= ⅓ ,,
1 ,, ...	= 15·43 grains.
½ ,, or 500 milligrammes ..	= 7·7 ,,

MEASURES. IMPERIAL TO METRIC.

minim	Cc.	minims	Cc.	fluid oz.	Cc.
½	= 0·03	15	= 1·0	1	= 30·0
1	= 0·06	20	= 1·2	fluid ozs.	
minims		25	= 1·5	2	= 60·0
2	= 0·12	30	= 2·0	4	= 115·0
3	= 0·2	40	= 2·5	5	= 140.0
4	= 0·25	45	= 3·0	6	= 170·0
5	= 0·30	60	= 4·0	8	= 230·0
6	= 0·4	90	= 6·0	10	= 280·0
8	= 0·5	120	= 8·0	20	= 568·0
10	= 0·6	240	=15·0	gallon	litres.
12	= 0·8			1	= 4·536

MEASURES. METRIC TO IMPERIAL.

1 Cc.	= 15 (nearer 17) minims.
1 litre	= 1 pint 15 fl. oz. approx.

MEASURES OF LENGTH.

1 micromillimetre	= $\frac{1}{1000000}$ millimetre, usually represented by $\mu\mu$.
1 micron	= $\frac{1}{1000}$ millimetre, or 1 micrometre, ,, μ.
1 millimetre	= 0·039370 inch.
1 centimetre	= 0·3937 inch.
1 decimetre	= 3·937 inches.
1 metre	= 39·370113 inches or 1 yard 3·37 inches nearly.

PERCENTAGE AND GRAINS PER FLUID OUNCE EQUIVALENTS.

%	Grains per fluid ounce.	%	Grains per fluid ounce.	%	Grains per fluid ounce
10·0	43·75	4·5	19·7	1·4	6·1
9·5	41·56	4·0	17·5	1·3	5·7
9·0	39·4	3·5	15·3	1·2	5·25
8·5	37·2	3·0	13·1	1·1	4·8
8·0	35·0	2·5	10·95	1·0	4·4
7·5	32·8	2·0	8·75	0·9	3·95
7·0	30·6	1·9	8·3	0·8	3·5
6·5	28·45	1·8	7·9	0·7	3·05
6·0	26·25	1·7	7·45	0·6	2·6
5·5	24·05	1·6	7·0	0·5	2·2
5·0	21·9	1·5	6·55	0·4	1·75

NEUTRALISATION TABLE.

		Citric Acid. grains.	Tartaric Acid. grains.
Ammonium Carbonate (if pure)	10 grains neutralise	13	14
Magnesium Carbonate		14	16
Potassium Bicarbonate		7	7¾
Sodium Bicarbonate		8½	9
Sodium Carbonate (+10 H_2O)		5	5¼

Lemon Juice (freshly expressed from *Citrus Medica var. B. Limonum*) contains from 30 to 40 grains Citric Acid per ounce. A good lemon yields on average an ounce of juice.

Arithmetical Memoranda.

Ratio of circumference of a circle to its diameter $= \pi = 3{\cdot}14159$. Circumference of a circle $= 2\ \pi\ r$.

Area of a circle $= \pi\ r^2$.

Area of a Triangle with base a and height $h = \frac{1}{2}\ a\ h$.

Volume of a Cube with length $l = l^3$.

Volume of a Cylinder $= \pi\ r^2\ h$. If r and h be in inches, this divided by 277·278 the result is in gallons (water).

$$\text{Volume of a Cone} = \frac{\pi\ r^2\ h}{3}$$

$$\text{Volume of a Sphere} = \frac{4}{3} \pi\ r^3$$

gallon of Water weighs 10 pounds; 1 gallon contains 277·278 cubic inches

RELATION OF VOLUME TO MASS.

(from the British Pharmacopœia)

1 minim = the volume at 16·7° C. of 0·9114583 grains of water.

1 fluid drachm = the volume at 16·7° C. of 54·6875 grains of water.

1 fluid ounce = the volume at 16·7° C. of 437·5 grains of water.

109·7143 minims (taken as 110 minims) = the volume at 16·7° C. of 100 grains of water.

THERMOMETRIC EQUIVALENTS.

For temperatures below the freezing point of water:—

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
—	—	—	—	—	—	—	+	—	+
40	40.0	31	23.8	22	7.6	16	3.2	7	19.4
39	38.2	30	22.0	21	5.8	15	5.0	6	21.2
38	36.4	29	20.2	20	4.0	14	6.8	5	23.0
37	34.6	28	18.4	19	2.2	13	8.6	4	24.8
36	32.8	27	16.6	18	0.4	12	10.4	3	26.6
35	31.0	26	14.8	17.778	0.0	11	12.2	2	28.4
34	29.2	25	13.0	—	+	10	14.0	1	30.2
33	27.4	24	11.2	°	°	9	15.8	0	32.0
32	25.6	23	9.4	17	1.4	8	17.6		

For temperatures above the freezing point of water:—

°C.	°F.	°C.	°F.	°C.	°F	°C.	°F.	°C	°F
+	+	+	+	+	+	+	+	+	+
1	33 8	39	102·2	77	170·6	115	239·0	153	307·4
2	35·6	40	104·0	78	172 4	116	240·8	154	309·2
3	37·4	41	105·8	79	174·2	117	242·6	155	311·0
4	39·2	42	107·6	80	176·0	118	244·4	156	312 8
5	41·0	43	109·4	81	177·8	119	246·2	157	314·6
6	42·8	44	111·2	82	179·6	120	248·0	158	316·4
7	44·6	45	113·0	83	181·4	121	249·8	159	318·2
8	46·4	46	114·8	84	183·2	122	251·6	160	320·0
9	48·2	47	116·6	85	185·0	123	253·4	161	321·8
10	50·0	48	118·4	86	186·8	124	255·2	162	323·6
11	51·8	49	120·2	87	188·6	125	257·0	163	325·4
12	53·6	50	122·0	88	190·4	126	258·8	164	327·2
13	55·4	51	123·8	89	192·2	127	260·6	165	329·0
14	57·2	52	125 6	90	194 0	128	262·4	166	330·8
15	59·0	53	127·4	91	195·8	129	264·2	167	332·6
16	60·8	54	129·2	92	197·6	130	266·0	168	334·4
17	62·6	55	131·0	93	199·4	131	267·8	169	336·2
18	64·4	56	132·8	94	201·2	132	269·6	170	338·0
19	66·2	57	134·6	95	203·0	133	271·4	171	339·8
20	68·0	58	136·4	96	204·8	134	273·2	172	341·6
21	69·8	59	138·2	97	206·6	135	275·0	173	343·4
22	71·6	60	140·0	98	208·4	136	276·8	174	345·2
23	73·4	61	141·8	99	210·2	137	278·6	175	347·0
24	75·2	62	143·6	100	212·0	138	280·4	176	348·8
25	77·0	63	145·4	101	213·8	139	282·2	177	350·6
26	78·8	64	147·2	102	215·6	140	284·0	178	352·4
27	80·6	65	149·0	103	217·4	141	285·8	179	354·2
28	82·4	66	150·8	104	219·2	142	287·6	180	356·0
29	84·2	67	152·6	105	221·0	143	289·4	181	357·8
30	86·0	68	154·4	106	222·8	144	291·2	182	359·6
31	87·8	69	156·2	107	224·6	145	293·0	183	361·4
32	89·6	70	158·0	108	226·4	146	294·8	184	363·2
33	91·4	71	159·8	109	228·2	147	296·6	185	365·0
34	93.2	72	161·6	110	230·0	148	298·4	186	366 8
35	95·0	73	163·4	111	231·8	149	300·2	187	368·6
36	96·8	74	165·2	112	233·6	150	302·0	188	370·4
37	98·6	75	167·0	113	235·4	151	303·8	189	372·2
38	100·4	76	168·8	114	237·2	152	305·6	190	374·0

Thermometric Equivalents—*continued.*

°C.	°F.	°C.	°F.	°C.	°F	°C.	°F.	°C.	°F.
+	+	+	+	+	+	+	+	+	+
191	375·8	213	415·4	235	455·0	257	494·6	279	534·2
192	377·6	214	417·2	236	456·8	258	496·4	280	536·0
193	379·4	215	419·0	237	458·6	259	498·2	281	537·8
194	381·2	216	420·8	238	460·4	260	500·0	282	539·6
195	383·0	217	422·6	239	462·2	261	501·8	283	541·4
196	384·8	218	424·4	240	464·0	262	503·6	284	543·2
197	386·6	219	426·2	241	465·8	263	505·4	285	545·0
198	388·4	220	428·0	242	467·6	264	507·2	286	546·8
199	390·2	221	429·8	243	469·4	265	509·0	287	548·6
200	392·0	222	431·6	244	471·2	266	510·8	288	550·4
201	393·8	223	433·4	245	473·0	267	512·6	289	552·2
202	395·6	224	435·2	246	474·8	268	514·4	290	554·0
203	397·4	225	437·0	247	476·6	269	516·2	291	555·8
204	399·2	226	438·8	248	478·4	270	518·0	292	557·6
205	401·0	227	440·6	249	480·2	271	519·8	293	559·4
206	402·8	228	442·4	250	482·0	272	521·6	294	561·2
207	404·6	229	444·2	251	483·8	273	523·4	295	563·0
208	406·4	230	446·0	252	485·6	274	525·2	296	564·8
209	408·2	231	447·8	253	487·4	275	527·0	297	566·6
210	410·0	232	449·6	254	489·2	276	528·8	298	568·4
211	411·8	233	451·4	255	491·0	277	530·6	299	570·2
212	413·6	234	453·2	256	492·8	278	532·4	300	572·0

EQUIVALENTS WITHIN CLINICAL LIMITS.

°C.	°F	°C.	°F.	°C.	°F.	°C	°F.	°C.	°F.
35·0	95·0	36·9	98·42	38·8	101·84	40·7	105·26	42·6	108·68
35·1	95·18	37·0	98·60	38·9	102·02	40·8	105·44	42·7	108·86
35·2	95·36	37·1	98·78	39·0	102·20	40·9	105·62	42·8	109·04
35·3	95·54	37·2	98·96	39·1	102·38	41·0	105·80	42·9	109·22
35·4	95·72	37·3	99·14	39·2	102·56	41·1	105·98	43·0	109·40
35·5	95·90	37·4	99·32	39·3	102·74	41·2	106·16	43·1	109·58
35·6	96·08	37·5	99·50	39·4	102·92	41·3	106·34	43·2	109·76
35·7	96·26	37·6	99·68	39·5	103·10	41·4	106·52	43·3	109·94
35·8	96·44	37·7	99·86	39·6	103·28	41·5	106·70	43·4	110·12
35·9	96·62	37·8	100·04	39·7	103·46	41·6	106·88	43·5	110·30
36·0	96·80	37·9	100·22	39·8	103·64	41·7	107·06	43·6	110·48
36·1	96·98	38·0	100·40	39·9	103·82	41·8	107·24	43·7	110·66
36·2	97·16	38·1	100·58	40·0	104·0	41·9	107·42	43·8	110·84
36·3	97·34	38·2	100·76	40·1	104·18	42·0	107·60	43·9	111·02
36·4	97·52	38·3	100·94	40·2	104·36	42·1	107·78	44·0	111·20
36·5	97·70	38·4	101·12	40·3	104·54	42·2	107·96		
36·6	97·88	38·5	101·30	40·4	104·72	42·3	108·14		
36·7	98·06	38·6	101·48	40·5	104·90	42·4	108·32		
36·8	98·24	38·7	101·66	40·6	105·08	42·5	108·50		

The Reaumur scale (with zero at freezing point of water and the boiling point of water being 80°) is now little used.

To convert a temperature in Centigrade into Fahrenheit multiply by and add 32.

Conversely to transpose Fahrenheit into Centigrade subtract 32 and multiply by $\frac{5}{9}$.

To convert Centigrade into Reaumur multiply by $\frac{4}{5}$.

To convert Reaumur into Centigrade multiply by $\frac{5}{4}$.

To convert Fahrenheit into Reaumur subtract 32 and multiply by $\frac{4}{9}$.

To convert Reaumur into Fahrenheit multiply by ^{9} and add 32.

INTERNATIONAL, 1917, ATOMIC WEIGHTS.

(*There has been no alteration since the* 1917 *figures.*)

The Molecular Weights of Compounds following symbols in our work are given throughout in terms of the International, 1917, Atomic Wts.

		I. Wts. O=16.
Aluminium	Al	27·1
Antimony	Sb	120·2
Argon	A	39·88
Arsenic	As	74·96
Barium	Ba	137·37
Bismuth	Bi	208·0
Boron	B	11
Bromine	Br	79·92
Cadmium	Cd	112·4
Cæsium	Cs	132·81
Calcium	Ca	40·07
Carbon	C	12·005
Cerium	Ce	140·25
Chlorine	Cl	35·46
Chromium	Cr	52·0
Cobalt	Co	58·97
Columbium	Cb	93·1
Copper	Cu	63·57
Dysprosium	Dy	162·5
Erbium	E	167·7
Europium	Eu	152·0
Fluorine	F	19
Gadolinium	Gd	157·3
Gallium	Ga	69·9
Germanium	Ge	72·5
Glucinum	Gl	9·1
Gold	Au	197·2
Helium	He	4·0
Holmium	Ho	163·5
Hydrogen	H	1·008
Indium	In	114·8
Iodine	I	126·92
Iridium	Ir	193·1
Iron	Fe	55·84
Krypton	Kr	82·92
Lanthanum	La	139·0
Lead	Pb	207·2
Lithium	Li	6·94
Lutecium	Lu	175·0
Magnesium	Mg	24·32
Manganese	Mn	54·93
Mercury	Hg	200·6
Molybdenum	Mo	96·0
Neodymium	Nd	144·3
Neon	N	20·2
Nickel	Ni	58·68
Niton (Ra Emanation)	Nt	222·4
Nitrogen	N	14·01
Osmium	Os	190·9
Oxygen	O	16·00
Palladium	Pd	106·7
Phosphorus	P	31·04
Platinum	Pt	195·2
Potassium	K	39·1
Praseodymium	Pr	140·9
Radium	Ra	226·0
Rhodium	Rh	102·9
Rubidium	Rb	85·45
Ruthenium	Rn	101·7
Samarium	Sa	150·4
Scandium	Sc	44·1
Selenium	Se	79·2
Silicon	Si	28·3
Silver	Ag	107·88
Sodium	Na	23·0
Strontium	Sr	87·63
Sulphur	S	32·06
Tantanium	Ta	181·5
Tellurium	Te	127·5
Terbium	Tb	159·2
Thallium	Tl	204·0
Thorium	Th	232·4
Thulium	Tm	168·5
Tin*	Sn	118·7
Titanium	Ti	48·1
Tungsten	W	184·0
Uranium	U	238·2
Vanadium	V	51·0
Xenon	X	130·2
Ytterbium	Yb	173·5
Yttrium	Yt	88·7
Zinc	Zn	65·37
Zirconium	Zr	90·6

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* H. V. A. Briscoe on a redetermination of the atomic weight of this element found as a mean 118·699.—C.D. Dec. 12/14. Ind. Fo. 794.

Suggested International Atomic Weights for Pharmaceutical Purposes.*

Aluminium	27	Lithium	7
Antimony	120	Magnesium	24
Arsenic	75	Manganese	55
Barium	137	Mercury	200
Bismuth	208	Nitrogen	14
Boron	11	Oxygen	16
Bromine	80	Phosphorus	31
Calcium	40	Platinum	195
Carbon	12	Potassium	39
Cerium	140	Silicon	28
Chlorine	35·5	Silver	108
Chromium	52	Sodium	23
Copper	63·5	Strontium	88
Gold	197	Sulphur	32
Hydrogen	1	Tin	119
Iodine	127	Zinc	65
Iron	56	Thorium	232
Lead	207		

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* From a Paper by W. H. M., read at an Evening Meeting of the Pharmaceutical Society of Great Britain in London.—P.J. i./ii, 170, 178

MEMORANDA.

The Authors would welcome any suggestions from Medical Men, Pharmacists, or Analysts.

ACETANILIDUM (*Off.*).

Syn. ANTIFEBRIN, PHENYLACETAMIDE.

$CH_3CO.\ NH.C_6H_5 = 135·122$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) Maximum single dose 8 grains (**0·5 Gm.**); Max. daily dose 23 grains (**1·5 Gm.**). May be given in cachets or suspended in water by compound tragacanth powder.

Prepared by the action of glacial acetic acid on aniline. In small white odourless glittering crystals with M. Pt. 113°C., which produce a burning sensation on the tongue.

Antidotes.—Emetics, Inhalation of Ether and Oxygen, Stimulants—*e.g.*, Strychnine hypodermically, warmth to feet and body.

Soluble 1 in 210 of water, slightly in glycerin, 1 in 4·2 of alcohol 90%, 1 in 20 of brandy with difficulty; easily in chloroform, benzol and ether.

Uses.—As a febrifuge and antipyretic, hypnotic sedative, anti-epileptic, anti-arthritic, and nervine tonic. Checks the chills and fever of phthisis, quiets the nervous system, and is useful in typhoid. Relieves sciatica and the darting pains of locomotor ataxy.

Wounds (amputations, also injuries to limbs by accidents) have been well treated by acetanilide as a dusting powder. 25 years' experience of its antiseptic use. Employ Hydrogen Peroxide first. Could be used in war without fear of inflammation or suppuration. Syphilitic sores have been similarly dressed.—E. F. Greene, B.M.J. i/15, 928.

Tablets, 3 grains (**0·2 Gm.**). *Dose.*—1 or more.

Also made **with Caffeine**, 1 grain; useful in migraine.

Effervescent Acetanilide. *Dose.*—1 drachm.

In two strengths, 1 and 3 grains in 1 drachm.

Pulvis Acetanilidi Compositus, U.S. VIII. (*not now in U.S.*).

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

Acetanilide 7, Caffeine 1, Sodium Bicarbonate 2.

Elixir Acetanilidi Compositum.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Acetanilide 326 grains, Caffeine 32 grains, Nux Vomica Tincture 256 minims, Aromatic Spirit of Ammonia 8 ounces, Aromatic Elixir to 16 ounces. Filter with aid of Talc 120 grains.

Headache well treated.—Am. Jl. Ph. Jan, 1912, p. 38.

For deaths from and risks with Acetanilide; Tests for Acetanilide, also use of Acetanilide in the form of 'TUBES TEMOINS' *to determine efficient sterilisation of Dressings, see Vol. II.*

✶**Ammonol** (T.M. 204599).

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

A white powder, containing acetanilide, sodium bicarbonate and ammonium carbonate. **Tablets** 5 grains. Relieves dysmenorrhœa.

Ammonol Salicylate is also made.

✶**Phenalgin.** (T.M. 221616). Said to be 'Phosphoammoniophenylacetamide.' *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**).

A mixture with antifebrin (50% on the label) as the active base, as an antipyretic and hypnotic. **Tablets and Gelatin (Hard) Capsules**, 5 grains.

✱Exalgine. (T.M. 90208). *Syn.* METHYLACETANILIDE. FR. CX. $C_6H_5N\,(CH_3)\,CH_3CO=149{\cdot}143$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill. In colourless crystals, with a slight saline taste.

Soluble 1 in 60 of water, freely so in alcohol.

Mistura Exalgin. *Dose.*—2 to 4 drachms (**8 to 15 Cc.**) Exalgine 1, Tincture of Orange 4, Syrup of Orange-Flower 12, Water to 100.

Tabellæ Exalgin—½ grain (**0·03 Gm.**) each, with chocolate.

An analgesic, anti-neuralgic, antipyretic (only in unsafe doses). Toxic doses cause paralysis of respiratory organs.

Incompatible with salicylic acid.

ACETONUM (*Off.*), U.S.

Syn. DIMETHYL-KETONE. $CH_3CO.CH_3=58{\cdot}063$.

Dose.—60 to 90 minims (**4 to 6 Cc.**) daily.

A clear, colourless, light, inflammable, neutral liquid, with etherea odour and camphoraceous taste, contained in crude wood spirit, obtained by the dry distillation of acetates. It is miscible with water, alcohol, ether, chloroform, and oils, and is a ready solvent of fats and resins, pyroxylin, celluloid and many other organic substances. It takes up about 25 times its volume of acetylene. If pure, its Sp. Gr. is 0·795 to 0·8. B. Pt. 56·5°C. It is largely employed in the manufacture of chloroform.

It occurs in small quantity as a normal constituent in the urine, also (frequently in large amount) in that of diabetics, *c.f. Vol. II.*

Antiseptic Power.*—This we have determined using B. Coli Communis as test organism.—See Chapter on Antiseptics, Vol. II.*

Uses.—It has been employed in dyspnœa in above dose daily, and as an anthelmintic, and for cleansing the skin prior to operation.

Inoperable cancer of the uterus treated by Acetone, the idea being to harden the surface of the cancer so checking the discharge until the escharotic portion is cast off. The free surface can then be again treated. From ½ to 1 ounce is used at a time, being poured into the wound through a Ferguson's Speculum. Pelvis of the patient is raised as in the Trendelenburg position. The application lasts 15 to 20 minutes.—Pr. Feb./09,290. Does not cure but makes the life of the patient endurable.—B.M.J.E. i./10,8.—Pr. June, 1910, p. 778.

It checks hæmorrhage, lessens discharge and fœtor. It is not absorbed. The part is first thoroughly curetted. It is well to coat the vulva and vagina with a layer of soft paraffin. After the treatment with acetone the speculum is withdrawn, the cavity swabbed out and packed for 4 hours with a tampon coated with soft paraffin. The next application of acetone is in 5 or 6 days and then twice or thrice weekly. Contraindicated when the disease is so far advanced that an opening has formed into the rectum, peritoneal cavity or bladder.—L. ii./11,1784.

Iodo-Acetone.

Iodine 2% in Acetone is used to sterilise catgut. First steep in ligroin to free from fat.—L. i./06,1193, 1366. *Vide* also Iodised gut.

Acetophenone. *Syn.* HYPNONE. $C_6H_5CO.CH_3=120{\cdot}079$.

Dose.—1½ to 5 minims (**0·1 to 0·3 Cc.**) in almond emulsion, or with mucilage or syrup and peppermint water, or in **Capsules** containing ¾ minim. A colourless liquid, with odour of Bitter Almonds. Insoluble in water, but soluble in alcohol and oils. Used as an hypnotic requires care.

ACIDUM ACETICUM.

Acidum Aceticum Glaciale (*Off.*). Contains 98·9% Hydrogen Acetate. $CH_3.COOH=60·04$. Sp. Gr. 1·058.

A colourless liquid or crystals melting at about 14·7° C. Fr. Cx. —Sp. Gr. 1·0553 at 15° C.=100%.

Uses.—Is not given internally. It is applied to corns and warts. Has caustic action, but gives much pain.

Cancerous subcutaneous nodules can be destroyed by injecting with this Glacial Acid, but may reappear some weeks later.—B.M.J. i./09,583.

Psoriasis of a chronic type cured in a week or two by Glacial Acetic Acid locally—caused a certain amount of smarting at the time, but not severe.—B.M.J. ii./12,1214.

Antidotes.—Chalk and water, alkalis, magnesia, washing soda, and then demulcents such as olive or almond oil, milk, or white of egg.

Acidum Aceticum (*Off.*), 33%.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

This has Sp. Gr. 1·044. P. Austr. and P.G.V. designate this acid 'Dilutum.'

A product of the destructive distillation of wood and of the oxidation of ethylic alcohol.

Incompatibles.—Alkalis. (Hydrates, Carbonates, etc.)

Use.—Externally for ringworm.

Acidum Aceticum Dilutum (*Off.*), 5%.

Dose.—½ to 1 drachm (2 to 4 Cc.).

Sp. Gr. 1·007. (Fr. Cx. is 10%).

Uses.—May be given as an antidote to poisoning by alkalis, and largely diluted is applied as a lotion for inflamed joints, &c., and to bathe the skin as a refrigerant in cases of fever. Has been taken to reduce obesity, but is not to be recommended.

Cancer of the cervix uteri douched twice daily with weak solution of Acetic Acid. Patient kept fairly well for many years.—B.M.J. ii./09,1441.

Lotio Acidi Acetici R.O.H. Diluted Acetic Acid 6, Water to 100. Has been used to relieve itching and irritation, *e.g.*, in spring catarrh.

Acetum. *Syn.* Vinegar. Contains about 4% of acetic acid. Varieties are those made from Malt and from White Wine, but it is also made by diluting Acetic Acid and colouring with burnt sugar.

Acidum Pyrolignosum Crudum. A brown acid liquid, the product of destructive distillation of wood. Contains Acetic Acid 5 to 13% according to the kind of wood used, also other acids — Propionic, Butyric, etc., also small quantities of Methyl Alcohol, Furfural, Pyridine, Creosote and Resins. Has been employed locally to gangrene and has veterinary uses. It has antiseptic and preservative properties, *e.g.*, fresh meat dipped in it will keep for months.

Acidum Pyrolignosum Rectificatum.

Contains about 5% Acetic Acid. A yellowish liquid becoming darker on keeping, prepared from the above by fractional distillation, employing the first 80% passing over. Is occasionally ordered diluted 5 to 10% in mouthwashes and gargles.

A 2

Acetic Anhydride. $(CH_3CO)_2O$=102·068.

A colourless liquid with powerful acetic odour. Sp. Gr. 1·080. B. Pt. 138° C. Made by distilling acetyl chloride with an alkaline acetate. Tests 95 to 98% pure, the rest being acetic acid. Not employed medicinally to any extent, but chemically, *e.g.*, in the process of acetylation. Should be free from Hydrochloric Acid.

Commercial Varieties.—P.J. i./07,404.

Acetic Anhydride acting on solid Uranium Nitrate produces Nitrogen Peroxide.—P.J. ii./11,593.

Acetyl Chloride. CH_3COCl=78·494.

Manufacture.—By combining carefully Glacial Acetic Acid 130 with Phosphorus Pentachloride 137. Finally distil and redistil the fraction passing over below 60°C—this separates from phosphorus oxychloride. A volatile liquid with intensely penetrating odour, boiling at 51° C.

Acidum Amido-Aceticum.—*Syn.* GLYCOCOLL, GLYCINE.
$CH_2.NH_2.COOH$=75·06.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) suggested.

White crystals with sweet taste, ***soluble*** in water 1 in 4½, slightly in alcohol, not in ether. M. Pt. 234° C.

Manufactured synthetically by heating monochloracetic acid 1 with ammonium carbonate 3. to about 65° C., and finally to 130° C. Dissolve the residue in water, boil with lead oxide to remove ammonia, filter and remove the lead from the filtrate with Sulphuretted Hydrogen and evaporate to crystallise.

It is both acidic, by reason of its acid group and basic by reason of its amido grouping. It forms double salts with soluble metallic chlorides and nitrates.

The Amino-Acids are diuretic—they are decomposed by the liver with formation of urea. Gycocoll used as such is non-toxic and is not unpleasant to take. Experiments on healthy inidviduals showed decided increase in the output of urine under daily doses of 5 Gm.; Sp. Gr. remaining the same, also increase in Chlorides excreted. Clinically there was marked increase in the amount of urine excreted. In some cases good results by the use of Glycocoll with Digitalis.—P.J. ii./11,499.

The name "Glycin,"* though applied in Chemistry to this body, has been given (P.J. i./07,208) to *p*-oxy-phenyl-amido-acetic Acid C_6H_4OH NH $CH_2.COOH$.=167·122. Stated to be *Soluble* about 1 in 30 water, but we could not confirm this. A saturated solution made in the cold yields residue corresponding to solubility of 1 in 400. A boiled solution on the other hand yields residue=1 in 30 pointing apparently to decomposition. Used in photography as a developer.

For further consideration of AMINO-ACIDS *see Vol. II.*

Hydrargyri Amido-acetas. *Syn.* **Hydrargyrum Glycocoll,** $(C_2H_4NO_2)_2Hg$=348·704. *Dose.*—1/6 grain (**0·01 Gm.**) hypodermically. Manufactured by dissolving freshly made mercuric oxide in the acid. Used in syphilis.

Betaina. *Syn.* TRIMETHYL-GLYCOCOLL. $C_5H_{11}NO_2$=117·123.

Preparation.—Betaine occurs in *beets and marigolds* (especially *un*ripe roots). Boil Beat Molasses diluted with water 12 hours with Barium Hydroxide, filter after removing excess of Barium with Carbon Dioxide. Extract with Alcohol, concentrate the Alcoholic Liquor and add an Alcoholic Solution of Zinc Chloride. Filter off the precipitate, purify by recrystallising from water and precipitate with Barium Hydroxide. The liquid filtered from precipitated Zinc Oxide contains Barium Chloride. Precipitate exactly with Sulphuric Acid. By evaporating Betaine Hydrochloride crystallises out.

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*NOTE.—This was a Trade Mark (222,387). The registration has now been avoided, under the Patents, Designs and Trade Marks (Temporary Rules) Act 1914.

It is formed on oxidation of Choline (a non-poisonous syrupy fluid, *v.* also *Vol. II.*), $HO.N(CH_3)_3C_2H_4.OH. = 121{\cdot}155$. A decomposition product of Lecithin. Betaine has been found in a number of vegetable and animal substances.

Muscarine and Neurine are allied bodies.

Choline Borate $C_5H_{15}NO_2.H_3BO_3 = 183{\cdot}179$.

Commercially a 10% Aqueous Solution was termed ENZYTOL.

Dose.—Intravenously in cancer daily or three or four times weekly 3 to 5 gradually increased to 20 Cc. of the 10% Solution *diluted* with about 5 times its volume of Sterile Normal Saline. Thus 3 to 5 Cc. diluted to 20 Cc.; 6 to 8 Cc. diluted to 40 Cc.; 9 to 12 Cc. diluted to 60 Cc.; 20 Cc. diluted to 100 Cc. *Intramuscularly* the 10% Solution is used as such undiluted. Inject *slowly*. The Solution is not to be boiled. In tuberculosis commence with 1 Cc. of 10% dilution.

The injections may be alternately intravenous and intragluteal.

Uses.—For inoperable cancer and tuberculous affections. As adjuncts in the treatment, Thorium 'X' Intravenous Injections and 'X' Ray irradiations, also Metallic Colloids, Selenium and Vanadium were used.—B.M.J. ii./12,97.

The Choline should be synthetic and free from Neurine or may prove toxic.—C.D., January 30/13.

Neurine is chemically Trimethyl-Vinyl-Ammonium Hydroxide. $N.(CH_3)_3(C_2H_3)OH = 103{\cdot}139$.

A ptomaine resulting as a decomposition product of meat. Highly poisonous. Hygroscopic. Commercially a 25% solution is prepared. Gehe mentions 3 to 6% aqueous solution as being used to paint diphtheritic membrane.

Betainæ Hydrochloridum.—*Syn.* ✱ ACIDOL. (T.M. 263431.)
$C_5H_{11}NO_2.HCl = 153{\cdot}591$.

Dose.—1 to 8 grains (**0·06 to 0·5 Gm.**)

Manufacture.—Patented method from Molasses, etc.:—

The usual method of manufacture is based on the formation of the Hydrochloride by passing gaseous Hydrochloric Acid into the Molasses—left over after separation of the crystallisable bodies. The method in this patent, No. 11,351 of 1912, is stated to be based on accurate knowledge of the conditions under which Betaine Hydrochloride and the other Chlorides formed are soluble.—P.J. ii '12,552. See also C.D. i./10,423.

White crystalline substance soluble in water 1 in 2; in alcohol about 1 in 20. Liberates hydrochloric acid (almost 25% of its weight), and is given with pepsin or well diluted with water.

Flavoring.—Glyl Rosæ, Glyl Menthæ Piperitæ, Syl Caryophylli; Syrupus Aurantii.

Hypodermic use is said to have cured tetanus.

Acetamide. $CH_3.CO.NH_2 = 59{\cdot}06$.

Deliquescent crystals M.Pt. 82°C., made by interaction of Ammonia and Acetyl Chloride.

As a denaturant (½%) of Alcohol has been used *e.g.* in Phenacetin manufacture.

ACIDUM BENZOICUM (*Off.*).

Syn. Benzoyl Hydrate. $C_6H_5.COOH=122·083$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufactured either from Gum Benzoin or from Toluol, the former being the more expensive.

Soluble, if pure, 1 in 400 of water; 1 in 3 of alcohol 90%; 1 in 7 of chloroform: and very soluble in fats, oils, alkaline solutions (forming benzoates), and in glycerin about 1 in 30.

Incompatible with Ferric Salts and Mercuric Chloride.

Uses.—Benzoic acid is an antiseptic, a stimulating expectorant, antipyretic and diuretic. It is given in cases of chronic cystitis, urinary calculi and incontinence, also for rheumatism, further in large doses in phthisis, diphtheria, tonsillitis and scarlet fever. It prevents fats becoming rancid, as in Adeps Benzoatus, *q.v.*

Four grains of Benzoic Acid with 1 grain of Canada Balsam, or 1 minim of glycerin, make a good pill.

A one in 20 solution in alcohol relieves urticaria, and, as an **Antiseptic Lotion** or **Gargle**, 1 dissolved in 500 of water is employed, or it may be suspended with glycerin if more than will dissolve.

Uræmic convulsions cease under free use of benzoates.—B.M.J. ii./04,890; i./06,126.

15 to 20 grains every hour or 2 hours has specific remedial action in acute rheumatism, but is much weaker than Sodium Salicylate. —R. Stockman, B.M.J. i./13,597.

For use as preservative in Foods, etc., see Vol II.

Tablets, Compound, *v. Index.*

Benzoin.—There are two varieties known as Siam and Sumatra, the former being the best. Both are *Off.* if at least 85% soluble in alcohol 90%. *For source of Siam Benzoin, see Vol. II.*

Tinctura Benzoini Composita (*Off.*). *Syn.* Friars' Balsam, Traumatic Balsam.

Dose.—½ to 1 drachm (**2 to 4 Cc.**), with yolk of egg. U.S. has approximately same composition as *Off.*

A drachm to a pint of hot water is valuable as an inhalation in acute laryngitis. Undiluted it is used as a wound dressing.

For origin of Friars' Balsam, see Vol. II.

Tinctura Benzoini (Simplex), B.P.C.

One in 10 of Alcohol (90%). One in Rose Water 40, useful as a face lotion in urticaria and in irritable conditions of the skin.

Sphygmographic Varnish. Contains Benzoin, Balsam of Tolu and Alcohol. This is used for pulse tracings.

Collutorium Acidi Benzoici, R.D.H.

Dose.—One teaspoon to half a tumbler of water.

Benzoic Acid 10 grains, Krameria Tincture 15 minims, Saccharin 6 grains, Peppermint Oil 2 minims, Cinnamon Oil 2 minims, Alcohol 90% to 1 ounce. G.N.C. has also this formula approximately, designated **Lotio Krameriæ Composita.**

Miller's Mouth Wash is similar.

Trochisci Acidi Benzoici.

Contain ½ grain with either simple sugar or fruit basis (*Off.*); those of T.H. have a red currant basis. Useful as a voice lozenge.

Ammonii Benzoas (*Off.*). $C_6H_5.COONH_4=139·117$.
Dose.—5 to 15 grains (**0·3 to 1 Gm.**)

In colourless laminar crystals; *soluble* 1 in 6 of cold water, 1 in 30 of alcohol, and 1 in 8 of glycerin.

Flavoring.—Glyl Sassafras, Glyl Aurantii Amari; Syrupus Aurantii, Syrupus Tolutanus.

Useful expectorant in chronic bronchitis.

Where pyelitis is associated with cystitis the urine is frequently alkaline ammoniacal and offensive, and these conditions may be increased by the use of alkalies, while remedies which tend to favour the acidity of the urine such as Ammonium Benzoate or Salicylic Acid, may be preferable on account of their action within the bladder. Boric Acid is also useful.—Tirard, Med. Treatment.

Magnesii Benzoas $(C_6H_5.COO)_2Mg=266·47$.
Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

White crystalline powder. Antipyretic. *Soluble* in water 1 in 30, hardly soluble in alcohol 90%. *Incompatible* with Acids, also with Sodium Bicarbonate. Used as an anti-arthritic for rheumatism and cathartic in cirrhosis of the liver.

Sodii Benzoas (*Off*). $C_6H_5.COONa=144·075$.
Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

In white granular crystals; *soluble* 1 in 2 of cold water.

Two varieties are made, one from the acid obtained from Gum Benzoin, the other from the artificial acid—the cheaper of the two.

Flavoring.—Syl Vanillæ, Glyl Carui, Syrupus Aromaticus, Elixir Simplex.

Incompatible with acid preparations. It is apt to cause gastric irritation if taken on an empty stomach, owing to flow of gastric juice.—Jl. A.M.A. Mar. 5, 1910.

Uses.—*vide* Benzoic Acid. Acute lacunar tonsillitis is stated to be curable by Sodium Benzoate in 12 to 36 hours if given in 5—15 grain doses every 2 hours.—B.M.J. ii./09,196.

When raised arterial tension is a source of danger, may be given. —Brunton, L. ii./08,1132.

—In pyelitis due to *B. Coli* infection, Sodium Benzoate combined with Urotropin has given good results.—N.Y. Med. Rec.—May, 1910.

Tablets 2 grains each.

Effervescent Sodium Benzoate.
Dose.—1 drachm. Contains 6 grains in 1 drachm.

Acetozone.—A mixture of equal weights of BENZOYL-ACETYL-PEROXIDE, $C_6H_5CO.O.O.COCH_3 = 180·109$ and an inert absorbent powder (infusorial earth).

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) in cachet followed by copious draught of water.

Solutions for use in typhoid, dysentery, and cholera may be made by shaking 10 grains or less of the powder in 20 ounces of water.—Alcohol, glycerin and other organic substances should not be used.

Benzoyl-Acetyl-Peroxide is a white crystalline powder, M. Pt. 98° F. slightly soluble in oils and alcohol. Hydrolyses in presence of water. Should be kept dry. Is decomposed by alkalis, and it decomposes organic material. Antiseptic, deodorant, anæsthetic and diuretic. Ointments must be made with mineral fats.

After excision of tonsils good healing is effected by syringing with solution.

As a general surgical antiseptic 5 to 7 grains per pint of Sterile Water at 112° F., left to stand 2 hours and not filtered. For the Carrel-Dakin method 10 grains per pint. 20 grains per pint sterilises skin. Up to 60 grains for very septic cases. An efficient germicide (1 in 1,744) still effective in the presence of a blood serum against staphylococcus with 24 hours' exposure. 1 in 437 with 30 minutes exposure.—G. Gore-Gillon and R. T. Hewlett, B.M.J. ii./17,209.

Acetozone Inhalant contains 1% Acetozone with 0·5% Chloretone in liquid petroleum. A non-irritating bactericide employed in suppurative conditions of the nose, mouth, ear and throat.

Benzoyl Peroxide, C_6H_5—$CO.O_2.CO.C_6H_5$=242·15, a crystalline compound, M. Pt. 103·5°, prepared by the interaction of 100 of sodium peroxide and 180 of benzoyl chloride, at a low temperature. Soluble slightly in water, more so in alcohol.—F.N. 1908,34.

Uses.—For burns and ulcers 2 to 3% solution in oil.

***Cryogenin** (T.M. 248320).—*Syn.* META-BENZAMINE-SEMICARBAZIDE. $C_6H_4.CONH_2.NH.NH.\ CONH_2$=194·16.

Dose.—3 to 24 grains (**0·2 to 1·5 Gm.**).

A crystalline body *soluble* 1 in 100 of water and 1 in 25 of alcohol 90%.

A useful antipyretic in all acute fevers. Details of success in a case of erysipelas migrans successfully treated. Dose 10 to 15 grains per diem during 7 days, also in treatment of phthisis and lingering pyrexia following acute stages of an infection.—H. Sainsbury, L. ii./15,336. A. T. Davies adds his testimony in chest affections. Begins with 5 to 7 grain doses at 3 p.m. to anticipate the evening rise in temperature. If single dose not sufficient give 5 grains thrice daily in the 12 hours—*ibid.* 835. Also in typhoid.—B.M.J.E. i./05,19; L. ii./09,1812.

Acidum Hippuricum. *Syn.* BENZAMIDO-ACETIC ACID, BENZOYL GLYCOCOLL. $COOH.CH_2.NH.CO.C_6H_5$=179·127.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

This acid, occurring as white crystals, *soluble* in hot water (very slightly in cold—about 1 in 600), melting at 187° C., may be prepared from the urine of herbivora, also synthetically by treating glycocoll (Amido-acetic Acid, $CH_2NH_2.COOH$, *q.v.*) with Benzoyl Chloride or Benzoic Anhydride.

Manufacture.—Add dry powdered glycin to excess of Benzoic Anhydride heated in an oil bath until the mixture gradually becomes red. Dissolve the melt in water, neutralise with alkali, acidify and put aside for several days to completely throw out the acid. Filter off the precipitate and decolorise in boiling water with charcoal. Concentrate on water bath until crystallisation begins in the warm liquor. Gradually cool off and remove the Benzoic Acid formed simultaneously from the large crystals of Hippuric Acid by washing with Petroleum Ether (Ligroin). M.Pt. 187° C.—Curtius, Ber. 1884,1663.

Sodii Hippuras. $C_9H_8NaNO_3=201{\cdot}119$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

A soluble white powder used in gout, gravel, and calculus, as solvent for urates. A powerful depressant in arteriosclerosis.—B.M.J. i./05,57.

Ammonium Hippurate and **Calcium Hippurate** are salts with allied properties to the Sodium compound.

Acidum Anisicum (para-methoxy-benzoic acid) $C_6H_4OCH_3COOH=152{\cdot}104$, has no action of any kind whilst the ortho-analogue has no perceptible action in acute rheumatism.—R. Stockman. —B.M.J. i./13,599.

Acidum Phthalicum. $C_6H_4.(COOH)_2=166{\cdot}088$.

Dose.—20 grains 4 hourly. Has very slight anti-rheumatic effect. —B.M.J. i./13,600.

ACIDUM BORICUM (*Off.*).

Syn. Boracic Acid, Hydrogen Borate. $H_3BO_3=62{\cdot}024$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white laminar crystals, or as powder (that known as **Pulv. Acid. Boric. Subtilis** has been passed through a No. 170 sieve); with bitterish taste, made by the action of sulphuric acid on borax (and other borates).

Soluble 1 in about 25 of water, 1 in 3 of boiling water, 1 in 30 of 90% alcohol, 1 in 5 of glycerin at 0° C., 7 in 10 at 100° C., slightly soluble in volatile oils. Insoluble in ether.

May be made into pills with glycerin of tragacanth, or with one fifth of its weight of cream of tartar and water. Equal parts of boric acid and borax form a compound equally antiseptic and more soluble.

Incompatible with sodium salicylate in powder—a boro-salicylate apparently formed.—P.J. ii./05,869.

Uses.—Antiseptic and antiputrefactive. In powder and crystals as dressing to wounds, sores, and skin generally. Boric Gauze contains 20%, Boric Lint and Boric Wool 50%. When mixed with starch it forms a useful "dusting powder" for infants, &c. A little in the socks or stockings prevents the odour of perspiring feet.

In the form of **Eupad** and **Eusol** much used as wound dressing in the war.

Vomiting in gastric dilatation or gastric catarrh of infants. Wash out the stomach with weak Boric Acid Lotion.—M.A. 1911, p. 697.

Cachets of Boric Acid contain 10 grains (**0·6 Gm.**), as antiseptic before and after bladder operations, have been given in typhoid, also for cystitis. **Tablets** contain 5 grains.

50% of the acid administered is excreted in the urine within 12 hours, the other half remains in the body for 3 or 4 days, and hence may accumulate under repeated dosage.—B.M.J.E. i./06,16.

B. Coli grew with difficulty in sterilised urine after taking Boric Acid *per os.* It is efficient as a urinary antiseptic, its action being apparently unaffected by alkalinity. It is said to be the best antiseptic when the urine cannot be made acid by giving Sodium Acid

Phosphate (Hexamethylenetetramine acts only in acid urine). It is rapidly excreted.—A. Jordan, B.M.J. ii./13,653.

In otorrhœa alcoholic solution of boric acid better than powder.—B.M.J. i./06,250.

Rodent ulcer. A Boric Lotion and Adrenalin Solution applied had remarkable effect. In three weeks the ulcer healed.—Pres., Nov., 1912, 300.

Boric Acid Poisoning.—B.M.J. i./12, 605, 708, 816. A teaspoonful taken in error caused death.—L. ii./17,162.

Used for lavage may by idiosyncrasy prove poisonous.—B.M.J. i./12,832

Effects of a large dose of Boric Acid taken in error—rash produced. Emetic of mustard; stomach emptied and Magnesium Sulphate given.—B.M J. i./12,834

Eczema thought to have been caused by local use.—J. C. McWalter, B.M.J. i./15,1002.

With regard to the use of boric acid as a **milk, cream, etc., preservative,**—the quantity a child has to take may amount to 10 grains daily which may prove dangerous—*vide* also *Vol. II.*

Glycerinum Acidi Borici (*Off.*), **Glyceritum Boroglycerini.**

Heat Glycerin 9 (by weight) to not above 150° C., and add Boric Acid 6. Continue heat with stirring until weight is reduced to 10, and add Glycerin (by weight) 10. It is the equivalent of **Boroglyceride,** which was a patented preparation. **U.S.** has 31 in 100.

It is readily miscible with water and alcohol. It is used, 1 in 40 of water, as a food preservative. Of value in otorrhœa.

Pessus Boroglyceridi for vaginal use weigh 90 grains each, and contain 70 grains of Boroglyceride with gelatin and water, *q.s.*

Acidum Boro-Salicylicum.

Boric Acid 3, Salicylic Acid 1. A white powder, ***soluble*** about 1 in 120 of water. Is mostly employed as—

Sodium Boro-Salicylate.

Dose.—5 to 45 grains (**0·3 to 3·0 Gm.**).

Has been given in rheumatic affections.

Borsal.—Boric and Salicylic Acid in fine powder equal parts. Recommended by Sir Watson Cheyne for dusting into recesses of wounds as soon after infliction as possible. Prevents development of *B. Tetani* and gas gangrene organisms and occurrence of the associated diseases when combined with serum treatment.—B.M.J. i./15,912; L. i./15,714.

In support of this antiseptic *versus* "physiological methods." Experience was that Saline freely used in baths and by irrigation injured granulation cells so that they are robbed of their phagocytic value. Irrigate freely with 1 in 20 or 1 in 40 carbolic and dust with this powder. Hypertonic Saline viewed as a failure.—A Wilson, B.M.J. i./15,826.

Adverse criticism by J. G. Saner.—L. i./15,1225.

Liquor Antisepticus, U.S. VIII.

Average dose.—1 drachm (**4 Cc.**); Boric Acid 20, Benzoic Acid 1, Thymol 1, Eucalyptol 0·25, Oil of Peppermint 0·5, Oil of Gaultheria 0·25, Oil of Thyme 0·1, Alcohol 250 and Water to 1,000. Filtered through talc. Resembles ✱ **Listerine.** (T.M. 27665 Class 3, 259141 and 294469 Class 48.)

Lotio Acidi Borici, R.O.H. 4%.
A most useful soothing antiseptic lotion for the eyes, bladder, vagina and mouth.

Isotonic Boric Acid Lotion is 2% strength—isotonic with the tears.

Lotio Acidi Borici cum Zinci Sulphate, R.O.H.—
Boric Acid 2, Zinc Sulphate 0·125, Water to 100.

A.B.C. Powder.
Boric Acid, Bismuth Subnitrate, Calomel, equal parts. A stimulant antiseptic dusting powder.

Pastillus Acidi Borici, T.H., *v.* p. 429.
Useful in aphthous affections of the mouth and throat.

Pessus Acidi Borici.
Ten grains (0.6 Gm.) in each, with oil of theobroma.
Convenient to replace douches after delivery.

✱ **' Solubes ' Boric Acid,** 15 grains each. For dissolving in 2 ounces of water as an eye wash, or more for vaginal injection, or lotion to wounds.

' Solubes ' Boro-Saline contain—
Sodium Biborate 5 grains, Sodium Chloride 5 grains.

Solubes ' Borax Compound contain—
Sodium Biborate 5, Sodium Chloride 2½, Phenol ½, Sodium Bicarbonate 2½ grains.

Ⓟ**' Solubes ' Borax and Cocaine Compound** contain—
Sodium Biborate 2 grains, Sodium Chloride 6 grains, Boric Acid 1 grain, Benzoic Acid ¼ grain, Menthol $\frac{1}{100}$ grain, Thymol $\frac{1}{100}$ grain, Cocaine Hydrochloride $\frac{1}{10}$ grain.
Dissolved in 2 or 3 ounces of warm water and used as a nasal or throat spray.

Suppositorium Acidi Borici.
Three grains (0·2 Gm.) in each. Useful in pruritus.

Unguentum Acidi Borici—*Martindale.*

	No. 1.	No. 2.	No. 3.
Paraffin (M.Pt. 57° C.)	5	5	5
Vaseline	5	10	15
Boric Acid, in fine powder.. ..	2	3	4

Melt the paraffin and vaseline together; sift the Boric Acid into the liquid, and stir constantly till cold. These three ointments contain the same quantity of Boric Acid, *i.e.*, 1 to 5 of basis; they are also made **half** and **quarter strength** *i.e.*, 1 of the acid to 11 and 1 to 23 of basis respectively. The ointment of full strength is used where cavities exist; the others are softer and used to superficial wounds.

Boric Acid Ointment (No. 2) is for general use to surface wounds, burns, eczema, chaps, pruritus ani et pudendi, and sores, as an antiseptic dressing and 'healing ointment.'

The 'No. 3' is suitable for toilet use.—**' Boric Cream '** is similar.

' Collapsubes,' *i.e.*, collapsible tubes containing ointments, creams and lubricants, with catheter attachment for applying to the urethra, and with suitable tubes for the uterus and rectum. For general purposes ' Collapsubes alone are provided. *See* Index for list.

' Collapsubes ' are also suitable for introducing ointments into the nose. The patient should put the head well back and press the ointment into the nostrils.

Small size Collapsubes marked* in Index are convenient in ophthalmic surgery.

Drugs in a semi-solid cream in collapsible tubes for war use, *e.g.*, a cream containing 30 minims of Chlorodyne per inch of the exuding cream or Morphine 2 grains per inch, etc.—F W. Tunnicliffe, L.i/15, 274.

Unguentum Acidi Pheno-Borici.
Contains 2½% of Phenol added to either No. 1, No. 2, or No. 3 Boric Acid Ointment. In some cases this may prove more healing.

Unguentum Lano-Boricum Camphoratum.
Boric Acid Ointment (No. 2) ½ ounce, Hydrous Lanolin ½ ounce, Essential Oil of Camphor 20 minims.

For earache in children. Applied with a brush to the meatus.

Vaselinum Acidi Borici.—*Syn.* BORIC VASELINE.
Boric Acid in fine powder 1, White Vaseline 9.

In Collapsubes with catheter attachment for urethral use or with tube suitable for uterine or rectal use.

Magnesii Boro-Citras.
Dose.—15 to 30 grains (**1 to 2 Gm.**).

In white powder or colourless scales. ***Manufacture.***—Dissolve Light Magnesium Carbonate 70 in a solution of Citric Acid 100 in Water 400, add Boric Acid 30, evaporate to dryness on a water bath and powder or scale. ***Soluble*** in water; used as a urinary antiseptic internally for stone, gout, and rheumatism; and 1 with 2 of sugar is prescribed as **Boracite,** or **Pulvis Magnesii-Boro-Citratis Composita.** *Dose.*—60 grains *ter die*, to sterilise the urine 48 hours before operations.—L. i./03,836.

Undergoes some dissociation in the body, with hæmostatic effect, but inferior to the lactate *q.v.*

Sodii Biboras. BORAX. **Sodii Boras** (U.S.) $Na_2B_4O_7.10H_2O$ = 382·16.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Soluble 1 in 25 water, in glycerin 1 in 1, insoluble in alcohol (90%). ***Incompatible*** with gums, mineral acids, also with cocaine hydrochloride.

Flavoring.—Glyl Pini, Syl Lavandulæ, Syl Rosæ; Syrupus Aromaticus.

Uses.—As gargle in diphtheria, for aphthæ, cancrum oris, and gangrenous stomatitis; pruritus ani and vulvæ, in bromidrosis and fœtid sweating of the feet.

Gouty affections are treated with compresses of saturated solution.

In very chronic epilepsy as an adjuvant to bromide, reinforcing its effect.—L. i./09,908. Rashes may result with this treatment.—H.

Sodii Boro-Tartras. *Syn.* TARTARUS BORAXATUS. PH. NED.
Dose.—30 grains (**2 Gm.**).

Sodium Biborate 2, Potassium Acid Tartrate 5, Water 15, evaporate until a little of the residue cooled is brittle. Powder and dry at 50° C. Antiseptic and diuretic. May be tried for gout.

Sodii Perboras. $NaBO_3, 4H_2O$ = 154·064; derived from the hypothetical Perboric Acid, HBO_3 = 60·008. A white permanent powder. ***Soluble*** in water, about 1 in 20, with decomposition.

Manufacture.—Sodium Perborate may be prepared pure by treating Crystalline Borax 380 Gm. with Normal Sodium Hydrate Solution 2,000 Cc. to convert it into Sodium Metaborate—$NaBO_2$, and then adding to the solution 4,500 Cc. of 10 Volume Hydrogen Peroxide Solution. Cool immediately by refrigeration and collect and dry crystalline precipitate on filter paper.

Uses.—Antiseptic and deodorising.

Is stated to contain "10% active oxygen." This can be calculated as follows :—

2 $NaBO_3,4H_2O = Na_2B_2O_4 + O_2 + 4H_2O$, *i.e.*, 308·128 Sodium Perborate should produce 32 available Oxygen = 10% approx. allowing for impurity.

To produce **Oxygenated Water,** 1 kilo yields 104 Gm. or about 72 litres of active oxygen. This quantity will produce 7 to 7·5 litres of '10 volume' oxygenated water. The solution is not acid. It contains Hydrogen Peroxide and Borax.

In practice (*a*) 25 Gm. of the salt dissolved in a litre of water at 35° C is said to give a '5 volume' strength Hydrogen Peroxide Solution ; (*b*) 170 Gm. with 60 Gm. Citric Acid makes a litre of '10 volume' strength.—*Cf.* B M.J. i./05,42

Some experiments were instituted to confirm these figures. Sodium Perborate of commerce was found to be 87% pure. It was found that (*a*) above gave experimentally, only 1·6 times its volume approximately, NOT 5 times as stated. This, indeed, approximates theory as to above (which is virtually correct).

(*b*). Experimentally, 11 volumes of oxygen were produced.

These solutions may be used to prepare antiseptic lotions, vaginal injections (about '5 volume' strength), *e.g.*, in leucorrhœa and metritis, and are useful in minor surgery. The dry salt may be used as a disinfectant, deodorant dusting powder.

Soil-contaminated wounds—suggested use in, see Wounds.

Tonsillitis occurring as complication in typhoid treated with Sodium Perborate gargle, 2 drachms to the pint.—M.P. Feb./07,234.

Unguentum Sodii Perboratis. 1% in Paraffin Ointment basis antiseptic and healing.

Sodium Perborate Tooth Powder. Sodium Perborate in 2% Precipitated Calcium Carbonate.

✱Perborol (T.M. 280256) is a trade name for Sodium Perborate.

Sodium Perborate Mouth Tablets.—Patented method of manufacture No. 1578 of 1912. Tablets containing Sodium Perborate and an acid containing water of crystallisation, *e.g.*, Citric Acid, have the disadvantage of spontaneously decomposing, liberating Hydrogen Peroxide. This patent involves the use of mixtures of Perborate with a dry acid or an acid salt wherein the Perborate is partly or wholly dehydrated, a Carbonate being added. Sodium Bicarbonate may be added to form a stable product. On adding to water an alkaline solution of H_2O_2 is produced.—P.J. ii./12,232.

✱**Zoel** (T.M. 373442) **Antiseptic** contains Sodium Monoborate (Metaborate $NaBO_2$). Antiseptic and deodorant. A white granular substance soluble in water 1 in 18. It is alkaline in reaction and on this account permits a free flow of lymph without coagulating.—L. ii./16,832.

✱**Zymocide** (T.M. 244131).

A liquid antiseptic. Diluted 1 to 5 or 10 of water, is used as a vaginal douche, also as a tooth wash, etc. Said to contain Extracts of Golden Seal and Calendula, Zinc Sulphocarbolate, Boric Acid, Witch Hazel, Sodium Thymolate, Menthol, and the Oils of Wintergreen and Eucalyptus.

ACIDUM CARBOLICUM (*Off.*).

Ⓟ*Carbolic Acid and liquid preparations of Carbolic Acid and its homologues, containing more than 3% of these substances, except preparations for use as sheep wash or for any other purpose in connection with agriculture or horticulture, contained in a closed vessel distinctly labelled with the word 'Poisonous,' the name and address of the seller and a notice of the special purpose for which the preparations are intended.*

For further details and an Order in Council regarding the sale by retail by registered and unregistered persons of liquid preparations *sold as* Carbolic, Carbolic Acid, Carbolic Substitutes or Carbolic Disinfectant *containing not more than* 3% *of Phenols, see 'Orders in Council.'*

Ⓟ Phenol (*Off.*). *Syn.*—PHENYL HYDRATE, $C_6H_5OH.=94·078$
Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**)

FR. CX.; Max. single dose, 1½ grains; max. during 24 hours 4½ grains approximately.

In colourless crystals liable to become pink,—a little Sulphurous Acid will prevent this for a long time. Neutral to test paper; made by distillation of coal tar. M. Pt. 39·40° C.

Antidotes.—Give Sodium Sulphate or Magnesium Sulphate 1 or 2 ounces in ½ pint of water. (They do not act chemically but hinder absorption.) Wash out the stomach with water by a tube several times with great care. Apomorphine as emetic, but it does not always 'act'. White of egg, and large doses of any innocuous oil should be given. Calcium saccharate and Caffeine are also antidotes. Amyl Nitrite capsules, hot-water bottles. Camphorated Oil (2 drachms) has been used with recovery.

Iodine is believed to be the true antidote. Use within obvious limits the same quantity of Tincture of Iodine as of Liquid Carbolic Acid.—P.J. i./10,268. W. G. Smith, M.P.C. i./14,416.

The use of alcohol lavage is no good—promotes absorption; the same applies to plain water and glycerin.—D. I. Macht, Johns Hopkins Bulletin, L.i./15,1252. P.J. ii./16,181.

Solubility.—100 parts are liquefied by 10 of water, should form a clear liquid with 30 to 40 of water, and should be completely dissolved by 1,200 of water. Also soluble 3½ in 1 glycerin, 3 in 1 chloroform (nearly), 1 in 2 olive oil, 5 in 1 ether, 6 in 1 alcohol (90%), 2¼ in 1 benzol (nearly), and 1 in about 20 vaseline.

Flavoring.—Glyl Coriandri, Syl Vanillæ; Tinctura Lavandulæ Composita, Tinctura Cinnamomi.

Uses of Phenol.—A powerful antiseptic, anti-putrefactive, caustic, and applied locally, anæsthetic. Internally for dyspepsia and flatulence, *e.g.* with rhubarb and nux vomica extract in pill. Also for the plague, tetanus and erysipelas, in typhoid fever and diarrhœa, in pills coated to render them soluble in the intestines and in puerperal fever, phthisis, bronchitis, pertussis, and for the gangrenous stage of pneumonia.

As a vaginal injection one in 80 or more of water in leucorrhœa, uterine ulceration, erysipelas, and cancer; cleanses, heals, disinfects and allays pain, and is suitable as a gargle.

Mosquitos are kept away by 1% solution. It also relieves bites of same. 2% is effective for disinfecting instruments, the skin, and for artificial dentures left in soak all night.

In acute coryza a 1 in 100 carbolic spray is useful. Whitla Pract. Med. 245.

A 10% solution with cocaine added, relieves non-suppurative middle ear diseases.—B.M.J. ii./04,1211.

Compresses soaked with 5% solution of Phenol may cause coma.—L. i./95, 1362; M.C. Dec./97,208. Even 1 in 40 has caused carboluria and death when applied to penis after circumcision.—W. W. W. *cf.* L. i./09,564—but this is exceptional. Danger when used as dressings to extremities—fingers and toes.—L. i./03,1099. B.M.J. i./07,1110. P.J. ii./11,780.

Ochronosis associated with carboluria caused by local application of Carbolic Oil 1 in 20.—Q. Jl. Med., July, 1910.

Small-pox pustules have been touched with liquid acid with good results.—L. ii./03,1153,1781.

Tetanus treated by 1·5 Cc. of 2% Solution injected, repeated next day, then 1 Cc. again at noon, 4 and 8. Symptoms abated.—L. ii./08,1027. See also L. i./13,1530—20 minim doses of 1 in 40 Solution successful.

Tetanus treated with beneficial result, 1 to 2 Cc. of 2 or 3% Aqueous Solution injected at a time and repeated every hour for days, striking alleviation of spasms.—M.A. 1911,617.

Laryngeal tuberculosis amputation of the diseased portion of the epiglottis, and under cocaine pure carbolic acid was applied (four times at intervals of a fortnight) to the ulcerated area, no sign of infiltration or ulceration in the larynx.—P. R. S. M. Laryng. Section, 1911,43.

Sapræmia treated by swabbing out the uterus with a mixture of equal parts Carbolic Acid and Camphor.—L ii./09,339.

Appendical abscess treated by swabbing out cavity with pure Liquefied Phenol (after removing appendix if reasonably possible). Subsequently spreading Iodoform (any amount up to ½ teaspoonful) in same, after drying out. A rubber drainage tube ¼ inch in diameter is placed at the lower end of the cavity and an Iodoform gauze strip is packed into same sufficient to fill the cavity: this with the tube is conducted out of the abdomen about the centre of the wound. Subsequently they are removed.—B.M.J. i./11,676.

War wounds. When used pure cauterizes the surface and is only feebly antiseptic as its combination with albumin drains back all discharges. Solutions 1 in 60 on double cyanide gauze good "in a rush." Painless, but a weak destroyer of putrefactive organisms. Gauze must not be wrung out with the bare hand—Casualty Station experience.—A. Don, B.M.J. i./16,648.

Ⓟ**Absolute Phenol,** in the form of detached crystals melting at not lower than 39° C. (102° F.), these are hygroscopic and have a sweet taste, and are best adapted for surgical use.

Ⓟ**Tablets,** ¼ and ½ grain for internal administration.

Ⓟ**Solubes,** 5 and 20 grains, on dissolving, produce antiseptic lotions. Potassium Carbolate, in proportion of 1 molecule to 3 of Phenol assists solubility of Tablets of this kind.

A further variety is in crystalline masses, known as "Ice Crystals," melting at 39° to 40° C. (102° to 104° F.); termed No. 1 Acid.

Ⓟ**Acidum Carbolicum Liquefactum** (*Off.*).

Dose.—1 to 3 minims (0·06 to 0·2 Cc.).

Fifteen parts of water by weight added to 100 of above, *i.e.*, 87% nearly. Sp. Gr. 1·067 to 1·069. This is used as a caustic.

Trouble frequently arises with liquefied phenol crystallising in the winter, when there is a sudden drop in the temperature. Experiments which we conducted showed that the proportions 8-1, 9-1, 10-1, are all apt to separate.

Ⓟ**Carbolic Acid, Camphorated.**

Phenol 12, Camphor 4, Water 1.

Melt or rub together till liquefied. Is not miscible with water or glycerin. Antiseptic, and local anæsthetic, serviceable in toothache.

Ulcers produced by 'X' ray burns well treated locally by a mixture of equal parts of Carbolic Acid Crystals and Camphor.—M.A. 1911.670. *Caution.—Neither of these is intended for extensive general use. From their strength they are obviously not suitable for applying all over the face! Accidents have occurred.*

Acne.—In bad cases press out the comedones, puncture pustules, evacuate contents, and apply to each the smallest quantity of a mixture of carbolic acid crystals and camphor in equal parts or in proportion of 3 to 2. Subsequent usual sulphur applications.—Phineas Abraham. B.M.J. ii./12,289.

War wounds of all kinds, many of them 'large,' treated by application of equal parts Phenol and Camphor—highly spoken of. —I. Feldman and A. J. Walton, L. ii./16,1043.

'Phenolisation' of gas gangrene wounds with Phenol 9 and Alcohol 1—see Wounds, Therap. Index.

Ⓟ***Carbolic Acid Lotion.** *Syn.* PHENOL LOTION.

Liquefied Phenol 1, Water 19 or more as required.

Lotio Acidi Carbolici, R.O.H.

Phenol 1 in Water 20, 40, 60 or 100 at 50° C.

Solutio Phenolis, or Aqua Phenolata, to contain 2% of Phenol —C.U.D. Confirmed by F.I. Aqua Carbolisata P. Jap. is this strength.

P1 **Lotio Acidi Carbolici et Cocainæ.**

Carbolic Acid ½ drachm, Cocaine Hydrochloride ½ drachm, Cherry Laurel Water 1 ounce, Rose Water 3 ounces. For pruritus.—B.M.J. ii./04,980.

In the later stage of treatment of chronic eczema a Lotion containing Phenol, Liquor Picis Carbonis, Glycerin and Spirit as a stimulant to growth of healthier epidermis.—B.M.J. i./09,1342.

Ⓟ**Carbolic Oil.**

Phenol 1, Olive Oil 19 (more or less, if ordered). For burns and scalds.

Scarlet Fever.—Children suffering with, disinfected by rubbing with 10% Carbolic Oil or Eucalyptus Oil. Tonsils also painted with 10% Carbolic Oil during the first 24 hours.—B.M.J. ii./08,1333; see also *ibid.* ii./18,359.

We would suggest caution in such procedure.

Ⓟ**Lund's Oil,** **L.L.** *Syn.* Oleum Lubricans. CATHETER OIL. For oiling catheters, Phenol 1, Castor Oil 4, Almond Oil 20.

Surgical Lubricant for catheters, &c.

Starch 4, Glycerin 35, add Water 8½; heat to boiling, remove from flame and add Boric Acid in powder 2½, warm to dissolve, and when nearly cold add Phenol 1. The Lubricant is non-greasy and has the advantage over oily compounds of not attacking rubber goods. It can be removed by water. It will not attack metal instruments if left in contact for a short time, but is not intended as a coating to store them in—for this vaseline or liquid paraffin is best.

P1 **Catheter Lubricant. Meltzer's Formula. Am. Ph. A.**

Triturate Tragacanth 3 with Water 100, add Glycerin 20 and sterilise, then add Mercury Oxycyanide 0·25.

Gargarisma Acidi Carbolici.

Aqueous Solution 1 in 100 or more. For foul breath and sore throat. E.L. 1 of Glycerol of Carbolic Acid in 40.

Gauze, Carbolic, 5%, is in 6-yard pieces. **Carbolic Gauze Bandages (Lister's)** recommended as slightly sticky and not likely to be wound too tightly.—B.M.J. ii./07,504. **Gossypium Carbolisatum, Carbolic Wool,** Impregnate Absorbent Cotton 1 under pressure with 1 of an ethereal solution (5%) of Phenol. Spread out and dry rapidly. **Linteum Acidi Carbolici**, 5%.

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* But see par., page 13.

For various methods of preparation of **Catgut and other Ligatures**, *see Vol. II.*

Ⓟ**Glycerinum Acidi Carbolici** (*Off*). *Syn.* **Glyceritum Phenolis**, Phenol 1, Glycerin *q.s.* to 5. (U.S. Liquefied Phenol).

A throat pigment and applied to wounds and to ringworm. In acute middle ear catarrh with good result.—B.M.J. ii./04,1210.

For earache a few drops of Solution of Phenol ,6 grains to the ounce of Glycerin (**Guttæ Acidi Carbolici**) slightly warmed, are invaluable.

A solution of Phenol in Glycerin is almost non-caustic and only slightly toxic. See Iontophoresis.

For the itching of eczema, Carbolic Acid 4 grains, Glycerin 40 minims, Alcohol 90% to 1 ounce often valuable, but caution necessary —may irritate.—L. i./09,967.

Carbuncles well treated by applying pledgets soaked in the glycerol. As soon as pus shows the epithelium is turned back and the part may be later syringed out. No fear of absorption of the Acid owing to hygroscopic action of the Glycerin.—B.M.J. i./09,1481.

For a formula using **Glycerin Substitute,** *see p.* 430.

Ⓟ**Ravogli's Liniment.** Carbolic Acid 1, Glycerin 2, Alcohol 90% 16, Rose Water to 32. In skin affections.

Ⓟ**Pigmentum Antisepticum.**

For hay fever. Glycerin of Carbolic Acid 1 ounce, Quinine Hydrochloride 30 grains, forms a useful pigment for the nasal passages.

Solution of Phenol 2% in Spirit is used for diphtheritic membrane.

Ⓟ **Iodized Phenol.** **Pigmentum Iodi Carbolicum, Acidum Carbolicum Liquefactum et Iodum —C. H. W.**

Iodine 1, Liquefied Phenol 4. Digest till dissolved. For intra-uterine medication on cotton wool.

Chronic discharging sinuses treated by 5 minutes' application of iodized Phenol.—B.M.J. ii./11,1594.

Inoperable uterine carcinoma well treated after curetting by application of iodized phenol.—M.A. 1910,215.

Useful also for ring worm of the scalp. *Carefully distinguish from* :— **Dilute Iodized Phenol Injection.**

As pigment in diphtheria, or as a gargle or inhalation a much weaker preparation is made containing Solution of Iodine (Lugol's) 2·5, Phenol 1, Boiling Water to 200. Is useful also as a nasal douche in ozœna, and for intra-uterine injection.

Physicians should carefully specify which is required.

Tuberculous sinuses of ankle joint treated by injecting a solution of strength 320 grains of Iodine in 8 ounces of Liquefied Phenol—afterwards binding the walls together tightly. Important to protect healthy skin. Healed in two weeks.—B.M.J. ii./09,828.

For granular eyelids may be employed as a caustic. Applied on a small brush to the affected eye-lid edges with great care, holding the eyelid away and then washing off.—W. W. W.

Injectio Acidi Carbolici Hypodermica.
Dose.—5 to 20 minims (0·3 to 1·2 Cc.)

Two per cent. strength. This has been used for tetanus, erysipelas, and phlegmonous inflammations of the skin.—Whitla.

Ⓟ**Liquor Sodii Carbolatis.**
Dissolve Phenol 8, Caustic Soda 3½, in Distilled Water 100.

To be diluted with 10 to 20 times its volume of water.

These proportions of Phenol and Sodium Hydroxide are nearly the quantities required by theory, and they will be found to yield a sharp and pleasant mouth-wash.

Ⓟ**Phenol Sodique** used by dentists is similar.

Fr. Cx. has Carbolic Acid 100 Gm., Sodium Hydroxide Solution 20 Gm. (30% by weight). Water to 1,000 Cc.

The Sodium Hydroxide obviously is insufficient to combine with the Phenol. The Fr. Cx. preparation, in fact, contains about 8·6 Gm. per 100 Cc. *free* Phenol, only 1·4 of the total 10 Gm. being in the combined condition, whilst the Fr. Cx. 1884 had the correct proportions to make Sodium Phenate.—W. H. M. We assume that the production of a more powerfully antiseptic solution is aimed at, with at the same time a less pungent flavour than if a simple carbolic lotion were employed.

Antiseptic Dental * 'Solubes.'
For preparing an extemporaneous mouth-wash which is antiseptic and agreeably perfumed.

Contain Boric Acid, Sodium Phenate, Thymol, Sodium Benzoate, and Aromatic Essential Oils. Employed in the prevention of dental caries and in suppurating conditions. One to be used frequently in a wineglassful of water (preferably warm).

Pastillus Acidi Carbolici. (Glyco-Gelatin Basis.)
Contains ½ grain (0·03 Gm.) phenol. Antiseptic and stimulant For ulcers in the mouth or throat, and for purifying the breath.

Perles and Capsules of Carbolic Acid.
Globules of gelatin containing carbolic oil, one grain (0·06 Gm.) and two grains (0·12 Gm.) of Phenol in each. *Dose.*—1 or 2.

Pilula Acidi Carbolici.
Phenol 2, Powdered Liquorice 1, Powdered Althæa 1. In grains for one pill, in grammes for 15 pills.

Smelling Salts, Carbolised.
Phenol 24, Ammonium Carbonate 16, Strong Solution of Ammonia 44, Oil of Lavender 1½, Camphor 3, Pine Sawdust (sifted), *q.s.* For coryza, hay fever, influenza, &c.

Anti-Catarrhal Salts.
Phenol 1, Eucalyptus Oil 1, Pumilio Pine Oil ½, Strong Iodine Solution ½, Camphor 1, Ammoniated Alcohol 2, Pine Sawdust 2 or *q.s.*

Ⓟ**Resina Carbolica, R.D.H.**
Resin 4, Carbolic Acid 4, Chloroform 3. Dissolve.

This is used as an obtundent and a temporary antiseptic filling. Method.—Syringe out all food from the cavity and remove as much decay as possible. Apply on a wool pledget to relieve toothache.

Suppositorium Acidi Carbolici (*Off.*).

Phenol 0·8 Gm., White Beeswax 0·5 Gm., Oil of Theobroma, *q.s.* for 12.

Trochisci Acidi Carbolici (*Off.*).

One grain (0·06 Gm.) with Sugar basis, lemon flavored. For sores in mouth and throat.

Unguentum Acidi Carbolici (*Off.*).

Phenol 3% in White Paraffin Ointment. For ulcers and parasitic skin diseases.

An ointment made with Almond Oil or Adeps Lanæ instead of the Glycerin in the '98 B.P. formula is satisfactory.

P1 **Unguentum Acidi Carbolici cum Cocaina.**

Liquefied Carbolic Acid 20 minims Cocaine Hydrochloride 10 grains, Vaseline 1 ounce.

Ⓟ **Unguentum Acidi Carbolici cum Hydrargyri Perchlorido.**

Liquefied Carbolic Acid ½ drachm, Mercuric Chloride 2 grains, Olive Oil 2 drachms, Zinc Ointment to 1 ounce.

Both the above are used for pruritus.—B.M.J. ii./04,980.

Unguentum Acidi Carbolici cum Menthol.

Carbolic Acid 2, Menthol 1, Cold Cream 100.

For eczema with much itching.—H.

Vapor Acidi Carbolici.

20 drops of Liquefied Phenol in a pint of water at 60° C. Inhaled or as a spray, in pertussis and for throat ulcers. It lessens and disinfects the expectoration in bronchitis and gangrenous lung.

Ⓟ **Preservative Solution** for Anatomical Specimens, *e.g.*, for injection into the aorta.

Phenol 1, Glycerin 4, Methylated Spirit 5.

Acidum Sulphocarbolicum.

Syn. PHENOL-SULPHONIC or SOZOLIC ACID.

$$C_6H_4.OH.SO_3H = 174·138.$$

Prepared by the action of strong sulphuric acid on phenol. The *para* acid is produced in the warm (the *ortho-* when working in the cold), crystallises with difficulty, dissolves readily in water, alcohol, and glycerin, and is a strong antiseptic and disinfectant.

In gingivitis and pyorrhœa a 3% **solution** useful, reduces swelling, arrests flow of pus, and the gums return to their natural shape.

A 33% **solution** has been sold as **Aseptol.** Principally *para-* acid with only about 6% *ortho-*. To separate *ortho-* and *para-* acids utilise different solubilities of Mono-barium Salts—(SO_3H Salts)—that of the *ortho-* body crystallises out first. Similarly the *ortho-* magnesium compound is more soluble than *para*.—P.J. ii./07,817.

See also Water Analysis, Vol. II.

Cupri Sulphocarbolas.—*Syn.* CUPRI ASEPTOL.

$$(C_6H_4\,OH.SO_3)_2\,Cu + 6H_2O = 517·846.$$

In light green crystals, soluble in water, a useful hæmostatic or antiseptic lotion, or astringent injection, ¼ to 1½%.

Choleraic diseases marvellously treated with 1/24 grain per hour—

all serious symptoms abort in a few hours. It is convenient to use Tablet Triturates 1 grain each—one to be added to a 3-ounce mixture. One teaspoonful contains 1/24 grain. A little Paregoric and Cinnamon may be added. This seems to have beneficial action directly—especially to an inflamed colon.—Am. Jl. Clin. Med. per Pres. May, 1913,176.

Sodii Sulphocarbolas B.P. '98, SODIUM PHENOL-PARASULPHONATE $C_6H_4OH.SO_2ONa,2H_2O = 232{\cdot}122$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white rhombic crystals, somewhat like magnesium sulphate.

Soluble 1 in 5 of water, in alcohol 90% 1 in 130, by experiment.—W.H.M., Nov. 1915.

Is useful for flatulence, cholera, the dyspepsia of phthisis, and in tonsillitis 5 to 10 grains every 2 hours have been given.

Flavoring.—Diluted has little taste.

Dilatation of the stomach is well treated by an antiseptic mixture of Sodium Sulphocarbolate in doses of 5 to 10 grains with Sodium Bicarbonate, Spirit of Ammonia and Gentian Infusion, given after meals.—Sir W. Broadbent, ex Yeo.

In malignant endocarditis has been used in 30 grain doses, accompanied by inunctions of Carbolic Oil (1 in 5).—Whitla.

Zinci Sulphocarbolas. B.P. '98. ZINC PHENOL-PARA-SULPHONATE; ZINCI PHENOLSULPHONAS, $(C_6H_4OH.SO_3)_2Zn,H_2O = 429{\cdot}646$. The commercial salt contains $8H_2O$ (U.S.), making the molecular weight 555·758.

Crystals in rectangular colourless plates. ***Soluble*** 1 in 2 of water. In Alcohol 90% 1 in 3, by experiment.—W.H.M., Nov. 1915.

In gonorrhœa and leucorrhœa; 2 or 3 grains per ounce for injection.

'**Solubes,**' 2 and 10 grains (**0·12 and 0·6 Gm.**), produce 2 and 10 ounces or more respectively of lotions for external use or injection.

Tribromophenol.—*Syn.* BROMOL. $C_6H_2Br_3.OH = 330{\cdot}814$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill.

Manufacture.—By adding Bromine 120, in small portions, to Phenol 53, dissolved in water, *q.s.*, with continuous stirring and recrystallising the product from spirit.

In long silky needles, nearly insoluble in water, soluble 1 in 3 of alcohol 90%, 1 in 1 of ether, 1 in 3 of chloroform and glycerin; also soluble in fats and oils. M.Pt. 85° C. Used alone is strongly antiseptic; ointment (10%), oily solution (1 in 30). Is not dissolved by gastric juice, and is used as an intestinal disinfectant and in typhoid, also in minute doses for cholera infantum.

Tribromophenol-Bismuth.—*Syn.* **Bromphenobis.** ✱XEROFORM. T.M. 216423/1899; renewed 1912.

$(C_6H_2Br_3O)_2.Bi.OH + Bi_2O_3(?) = 1348{\cdot}62$. P. Jap. $Bi_2C_6H_3Br_3O_4$, also P. Helv.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufacture.—The British Patents 13291 of 1892 and 15361 of 1894 have lapsed. The specification of the U.S.A. Patent 516358 of 1894 mentions that :—

'30 kilos of Tribromphenol are dissolved with 4 kilos of Sodium

Hydroxide in 150 litres of water and afterwards mixed with 12 kilos of 'Nitrate of Bismuth.' The product is filtered, washed and extracted by alcohol. The alcohol takes up free Tribromphenol which is recovered. The yellow Tribromphenol Bismuth contains about 50% Bismuth Oxide.'

This method of procedure is misleading. An experiment showed that the finished article contained a varying proportion of Bismuth. The washing with Alcohol removed almost the entirety of the Tribromphenol.

Nevertheless, interaction certainly takes place between the Bismuth and the Tribromphenol in so far as an end reaction is visible—that is the Sodium Tribromphenol can be added until it ceases to produce a precipitate.

A special point regarding the method is that the resulting body is white or nearly white and not of yellow colour as stated.

Numerous experiments were conducted with, for example, Bismuth Subnitrate, freshly precipitated Bismuth Hydroxide, Bismuth Oxide, by interacting with Tribromphenol and with Sodium Tribromphenol, but without success. A definite chemical compound yielding the correct or even the approximate content of Bismuth Oxide cannot be produced on these lines. (*c.f.* also Tests *infra* for free Tribromphenol.) The addition of a Strong Solution of Bismuth Nitrate (cryst.) *to* a Strong Sodium Tri-bromphenol Solution was somewhat more promising.

It occurred to us that a SOLUTION of Bismuth in combination with an organic acid might well be tried and for this purpose we took Solution of Bismuth and Ammonium Citrate (*Off.*) and interacted with the necessary quantity of Sodium Tribromphenol.

The result was more promising but the compound either contained combined Ammonia or it was difficult to wash free from Ammonia.

The next step was to employ Bismuth Citrate.

THE PROCEDURE ULTIMATELY EVOLVED WAS AS FOLLOWS :—

Place Phenol 188 (2 molecules) in a suitable vessel and add with thorough stirring Bromine 960 in small portions at a time, the mixture being kept continuously under water. The end reaction is determined by the permanent appearance of a yellow tinge in the liquor and the fact that further addition fails to produce further precipitation.

The preparation is then washed thoroughly with water and the liquor reserved to be worked up for the Hydrobromic Acid produced in the reaction ($C_6H_5OH+6Br=C_6H_2Br_3OH+3HBr$).

In the moist condition this Tribromphenol can then be expeditiously converted into the sodium compound by adding a strong solution of Sodium Hydroxide with continuous stirring until solution is effected. Avoid excess and add if necessary a little water from time to time as interaction proceeds. The resulting solution will contain theoretically 706 (2 molecules) of Sodium Tribromphenol.

Bismuth Citrate 1191 (=3 molecules), is treated with two to three times its amount of water to make a paste and the Sodium Tribromphenol solution added with stirring, together with 280 of Sodium

Hydrate (7 molecules) to neutralise the Citric Acid formed. (2 molecules come from the Sodium Tribromphenol.)

The YELLOW body formed is now collected, boiled and washed with water and then with a little spirit and dried.

The filtrate contains some of the compound dissolved in the Sodium Citrate.

TESTS.—(Pharmacopœia Helvetica). Citron yellow or orange yellow powder, almost tasteless and odourless. The alkaline solution filtered and acidified with hydrochoric acid gives a floculent precipitate which on recrystallising from dilute alcohol melts at about 91° C.

If 0·5 Gm. Bismuth Tribromphenol be shaken with 5 Cc. Alcohol, 1 Cc. of the filtrate on diluting with 15 Cc. of water gives neither opalescence nor a precipitate of Tribromphenol.

THEORETICAL.

The formula for this compound has always been open to discussion. We have selected $(C_6H_2Br_3O)_2$ BiOH. Bi_2O_3 to work with as yielding the nearest to 50% Bi_2O_3. It yields 51% nearly.

$Bi_2O_3(C_6H_2Br_3OH)$ BiOH as given by FR. CX. yields theoretically over 68% Bi_2O_3.

$Bi_2O_3(C_6H_2Br_3OH)_2BiOH$ also yields 51% approximately.

$Bi_2O_2OH(O.C_6H_2Br_3)$ yields 58·4% approximately.

The following is an equation to represent the reaction as given in our directions :—

$$2(C_6H_2Br_3ONa) + 7NaOH + 3BiC_6H_5O_7 = (C_6H_2Br_3O)_2BiOH.Bi_2O_3 + 3C_6H_5O_7Na_3 + 3H_2O$$

Characters.—A yellowish insoluble powder, with faint odour and taste, containing bismuth oxide and tribromophenol in nearly equal proportions. Used as an intestinal antiseptic specially for cholera.

Gauze, Bromphenobis, 10%, 6-yard pieces.

Phenosalyl.

The Ⓟ following is similar.—Phenol 90, Salicylic Acid 20, Lactic Acid and Menthol of each 1, mix by heat. 0·2—0·4% in conjunctivitis and in eczema 1%.—M.Am.

Trichlorphenol.—*Syn.* TRICHLORPHENIC ACID. $C_6H_2Cl_3.OH=$ 197·434.

White crystals, with pungent taste ; soluble 1 in 1 alcohol, 2 in 1 ether, 1 in 9 glycerin, fixed and volatile oils. Ointment or solution 10%.

Para-Monochlorphenol. $C_6H_4Cl.OH=128·53$.

Manufacture.—By passing Chlorine into Phenol 3, kept cool with ice until the product weighs approx. 4. Fractionate the product, reserving the portion coming over at the correct boiling point.

Crystalline needles, *soluble* in alcohol and ether, but not in water to any extent. Melting at 37° C. and boiling at 217° C. **Liquid** para-Monochlor-phenol is practically identical and is used similarly. The *ortho-* body boils at 176° C. and the *meta-* melts at 28·5° C. and boils at 212° C.

A powerful antiseptic used in treatment of lupus, phthisis, keratitis, iritis, and is also employed in dental work as an analgesic. A paste for subsequent filling is made with powdered Cobalt and Tropacocaine Hydrochloride of each equal parts, with sufficient Para-Monochlorphenol and Zinc Oxide to produce a soft paste. The unpleasant taste may be moderated by Menthol.

5 to 10% in glycerin has also been used for laryngeal catarrh. Inhalations ¼ to ½%.

Unguentum para-Monochlorphenol.

Para-Monochlorphenol 1, 2 or 5, Vaseline 50, Hydrous Wool Fat 50. Chilblains are well treated with this and solution *c.f.* Therapeutic Index. To cover the objectionable penetrating odor we found Lavender Oil 2 to 5% useful.

Trimethol. Tri-Methyl-Methoxyphenol, $C_6H(CH_3)_3.OCH_3.OH.=166{\cdot}162$

Dose.—2½ minims (**0·15 Cc**). In capsules and in syrup—1¼ minim in 1 drachm (**0·075 Cc. in 4 Cc.**). An intestinal antiseptic.

✱ **Septovince** (T.M. 376606). — Trichloracetyl - Diphenol - Di - iodide. In acute rheumatism and skin affections. A 1 in 8 solution after allowing to deposit has been injected in 5 Cc. doses intramuscularly and applied locally.—P.J. ii./16,463.

ACIDUM CARBONICUM.

CARBON DIOXIDE, CARBONIC ANHYDRIDE. $CO_2=44{\cdot}005$.

Carbon Dioxide in the **gaseous condition** in small percentages has been advocated for use therapeutically, *i.e.*, when used in dilutions of 4 to 6% with air it stimulates expiration, acts as a cardiac stimulant, exerts an indirect effect as a sedative and possesses the property of toning up a weak pulse. It is also useful in spasmodic conditions. The gas may be collected from ordinary Soda Water Syphons, which hold about 2400 Cc. of the gas.The apparatus (for details of which *vide* B.M.J. ii./11,805; L. ii./11,505) is also suitable for giving CO_2+O+Air, or Oxygen + Air, or Oxygen + CO_2 in measured quantities. The latter is advocated as a cure and as a preventive for surgical shock and the risks of anæsthesia.

The gas has also been employed for inhalation in ozœna and nasal catarrh. It is believed to act as an antiseptic in such cases.

'Carbonic Snow' *i.e.*, Carbon Dioxide in the semi-solid condition, formed as the gas evaporates from a storage cylinder, is much employed as a caustic.

The procedure is known as **Refrigeration** or **Chrymotherapy** (κρυμός=frost). The gas cylinders containing some 20-30 pounds (7 lb. cylinders are also filled and may prove more convenient) at a pressure of about 950 lbs. to the square inch (65 atmospheres) yield the snow on opening with a temperature—79° C. (−110° F.), which by collecting in a suitable receptacle can be formed into a stick or crayon like an ordinary candle, or may be compressed into a mould and cut any shape with a knife. The cylinders should be mounted on a stand with the stopcock on a lower level than the opposite end so that the liquid gas covers the inner orifice of the valve.

Crayons, Method of Making.—The snow evaporates slowly—a crayon 5 by 1 inch will last about 1 to 2 hours. As many as thirty applications with this size can be made. The temperature of the crayon is *constant.* A towel is folded into three and wrapped round an ordinary ruler—the ruler is then removed and the tube thus produced is bound on to the valve of the CO_2 Cylinder, the gas is turned on and the towel tube fills with the snow. The frozen gas may then be pressed into a piece of Vulcanite or

Celluloid Tubing about 1 inch in diameter with a ruler. A cardboard postal tube or roll of blotting paper (several thicknesses) will also serve. Cover end of crayon with lint for handling. Can be pointed with a pen-knife or shaped by rubbing against the side of a vessel, *e.g.*, copper steriliser—containing hot water.

In eye work effects inflammatory reaction easily and safely.—B.M.J. ii./11,1176.

A few useful moulds may be made of the shape of an umbrella ferrule with rods to fit. Nævi, warts and moles, lupus erythematosus (application of less than 10 seconds of no use—in most cases 1 to 2 minutes required), lupus vulgaris (1½ to 2 minutes) well treated.—Stopford-Taylor & R. W. MacKenna, Liverpool Med. Chir. Jl., July, 1912.

An old glove finger suggested for collecting the CO_2 by tying on to the vent of the cylinder. When completely filled and rigid remove and with a sharp knife cut the end of the finger off at about 1½ inches from the point, thus exposing a corresponding length of the crayon, which can be used to the part, the rest of the glove finger serving as a holder.—Jl. A.M.A., April 6, 1912; P.J. ii./12,158.

The **✱ Prana** (T.M. 277674 Class 6) **Carbon Dioxide Snow Apparatus** is made in two sizes, one for hospital use and the other for the physician's hand-bag.

Hall-Edwards' Collector and Applicator.—The collector consists of a tube formed from a sheet of perforated zinc or tin, inside which is a tube of copper-wire gauze: between the two is a layer of felt. The complete tube is furnished at the upper end with a brass mount slightly tapered internally, and is about 8 inches long and 1¼ inch in diameter. At the lower end there is another brass mount. over which—by a bayonet-catch—a vulcanite end can be attached, this constituting the mould for compressing the snow. The open end of this mould is stoppered by a vulcanite plug during collection. By a tapered brass plug the gas bottle is attached to the upper end of the collector. and the turning of the key releases the gas. When there is sufficient snow in the collector, a vulcanite rod fitting the lower end is passed down the centre, and the snow falling into the mould is compressed. The bottom vulcanite plug is now removed and the vulcanite rod pushed through the hole, thus releasing the tablet. By regulating the pressure, tablets can be made of varying thicknesses. The applicator is made of vulcanite except the piston, which carries the plunger, the collar which guides it, and the spring which keeps it in position. The lower end of the tube is bevelled to form a thin edge, and the plunger is held up by a spring at about ¼ inch from the end of the tube. The plunger is perforated to allow of escape of gas and can be brought to a level with the end of the tube by pressure on knob. The ease of application is a feature of the instrument. the applicator being held like a hypodermic syringe, and pressure being applied by the thumb.—C.D. i./10,387, *v. also* L. ii./11.87.

Uses.—For removal of nævi, moles and blemishes, lupus erythematosus, lupus vulgaris, rodent ulcer, and warts (for last mentioned long application necessary). A single application usually suffices.

In the case of an ordinary capillary nævus 1 inch in diameter, the crayon is roughly shaped to that of the nævus—or slightly larger; it is applied and firmly pressed down for, on an average, 40 seconds. If there is bone immediately beneath, a shorter time will do. For a cavernous nævus the end of the crayon is made the same size or slightly smaller than the area of the growth. A long application with deep pressure should effectually freeze the whole mass.

In keratosis accompanying 'X' ray dermatitis, brief applications answer well. The hard white frozen surface, on removing the crayon, shows a depression according to the amount of pressure employed—the depression gradually returns to its normal shape. The treated area then becomes firmer and in two or three minutes swollen. A wheal forms with acute hyperæmia within half an hour and a vesicle usually within an hour, applying thirty seconds or longer, this will almost certainly be followed by scarring. An intense superficial destruction is obtained by a second application immediately after the tissues have thawed out.

Boric Acid Ointment is used for after-treatment. If blister forms the fluid is removed within a few days, the crust forming should be allowed to fall off. The scar ultimately is pale, soft and pliable.

No anæsthetic is ever necessary. The thawing out is more painful than the freezing. It is not a caustic—the whole of the treated area is still living. Capillary nævi of the raised form with a "raw beef" appearance easily treated, but port wine stains difficult. Not always successful in lupus vulgaris. For treatment of hairy moles the method should take a secondary place. Employ electrolysis for these. Warts may require a second or third application. 'X' rays preferable in treatment of keloids. Rapidly curative for rodent ulcer. Chronic localised eczema—a new and satisfactory use for CO_2. May be applied energetically in trachoma without risk.—L. i./13,1731.

Lupus erythematosus greatly improved by freezing the parts round the margin. Rodent ulcer also recovered. Painless.—L. i./10,28.

Telangiectatic or stellate nævi, pigmented and hairy moles, superficial lupus vulgaris, rodent ulcer, and lupus erythematosus successfully treated.—B.M.J. i./10,254, *et seq.*, also B.M.J. i./10,351.

For nævus, 10 to 30 seconds, application on cotton wool repeated once or twice at the same sitting, renewed at 8 to 10 days. Results good. Free from pain.—B.M.J.E. i./09,24, see also J. L. Bunch, B.M.J. i/11,247.

Eye affections treated.—M.A. 1911,306.

The treatment (*e.g.*, in eye work) can be adjusted to a nicety—the length of exposure (intense cold is as destructive to living tissues as heat) may be confined to producing a scarcely perceptible blanching of the part and subsequent minimal reaction, or the part can be completely frozen and the tissue thereby killed. In trachoma a well-defined shock to the tissues is induced with a subsequent brisk reaction. Applications are short and frequent. The lid is everted and separated from the globe by a non-conducting spatula,—the pencil is lightly pressed down on to the part of the conjunctiva to be treated for 15 to 30 seconds,—the longer time being reached by gradual increase with each weekly sitting.—B.M.J. ii./10,1311; M.A.1911,306; B.M.J. ii./11,107.

In treating corneal ulcers the surface of the ulcer is carefully touched with the pencils. It is not necessary to instil cocaine. If patient complains of discomfort the eye can be bathed with cold boracic lotion. Immediately afterwards the whole surface of the ulcer becomes white and raised, within twenty-four or thirty-six hours this "slough" separates, leaving a clean healing ulcer. Infiltrations disappear from the surrounding healthy cornea and hypopyon vanishes. The resulting opacity is less than in the case of ulcers of similar type and severity treated on other lines. After the application of the snow, pads and bandages are used instead of fomentations, and atropine sulphate 1% is instilled once daily. The method is not advised for marginal or ring ulcers.—Pres. June, 1911.

Rodent ulcer well treated. Granulating tissue first scraped away until a firm but raw surface left, then 20 to 40 seconds' application. using crayon same shape but little larger than the size of the ulcer. Repetition after 10 days may be necessary. Probably more permanent than ionisation.—L. ii./10,130; B.M.J. ii./11,1176. *c.f.* L. ii./10,1216; see also E. Graham Little.—B.M.J. i./11,13.

A piece of Salicylic plaster (25%) may be worn over the part for three or four days and to remove scab,if formed,prior to the freezing.

General psoriasis,—patches on each wrist removed by 30 seconds' application—perfect cure in three weeks.—B.M.J. i./11,416.

Vesication almost always follows 20 or more seconds' application. For a hard dry common wart two to even four minutes' exposure and firm pressure may be necessary. Capillary nævi, 90% cured with single application—cavernous 65%. In lupus vulgaris encouraging (clean the part and use antiseptic dressings afterwards). In treating a hairy mole the hairs are removed and do not return for a considerable time at least. Not advised for hypertrichosis.—B.M.J. ii./10,861; L. i./10,1270; B.M.J. ii./13,1007.

For large port wine stains and moles where many applications would have to be made Liquid Air (*q.v.*) is said to be more satisfactory. In treating a vascular growth the pressure used should be enough to arrest the circulation. A vesicle nearly always follows more than 15 seconds' application—generally seen in from one to three hours' time. It is well to puncture this with a sterile needle and dress with antiseptic ointment.—L. ii./11,87, *vide* also J. L. Bunch.—B.M.J. ii./12,297; ii./13,1006.

In hæmorrhoids Carbon Dioxide satisfactory.—B.M.J. i./12,120.

Oriental sore has been treated. Perseverance is necessary as there is strong tendency to recur. A solution of the Snow in Ether applied with a cotton wool tampon has been used in America, but this does not produce any greater intensity of cold nor reduce time of exposure.—J. L. Bunch, B.M.J. ii./13,1006.

Port wine stain complicated with a keloid produced by Carbonic Acid Snow and Nitric Acid—improved under Radium.—Dawson Turner, B.M.J. ii./13,1487.

Electrical Properties of Solid Carbon Dioxide.

C. E. S. Philips showed that when the nozzle of a steel cylinder is suddenly opened and the snow allowed to escape, an electrostatic voltmeter connected to the tube indicated a potential of 6,000 volts. The sign of the electricity is always negative—independent of the substance of the nozzle. The solid is rapidly changing to gas. The momentary surface of this snow is therefore very easily removed by contact or friction The fact that of two bodies rubbed together the one which loses its surface more easily becomes negatively electrified relatively to the other, seems to explain the invariable negative charge on the snow, irrespective of the material of the orifice from which it is forcibly ejected. Thus a stick of compressed CO_2 snow may be negatively electrified by lightly rubbing it with any other suitable material.—J.R.S., July, 1912.

For details of the presence of excess of CO_2 in the air and its effect on the human organism on inhalation, see Oxygen.

ACIDA CHLORACETICA.

Acidum Monochloraceticum. $CH_2Cl.COOH=94{\cdot}494$.

Preparation.—By passing dry chlorine on to the surface of boiling concentrated acetic acid either in presence of direct sunlight in such manner that chlorine is in excess—this takes a considerable length of time: or one employs Iodine 50 Gm. per ½ litre of acid at water bath temperature in default of sunshine. Several days will be necessary. When reaction complete boil under reflux condenser until Iodine vapour is no longer given off. Decant from the Iodine. When chlorination is completed distil, rejecting the Acetic Acid, which distils at up to 130° C. Collect the fraction 130°—190° and rectify this, reserving the 180°—188° C. fraction. The portion up to 180° C. can then be chlorinated again.

A chlorine compound of acetic acid, in deliquescent white crystals, melting at 63° C., or liquefied. It blisters the skin, and is a caustic for warts and corns. *Soluble* with ease in water, alcohol, and ether.

Acidum Dichloraceticum. $CHCl_2.COOH=128{\cdot}946$.

A colourless caustic for venereal sores.

Acidum Trichloraceticum. **U.S., P. Helv., Ph. Ned., P. Jap.,** $CCl_3.COOH=163{\cdot}398$.

Prepared by chlorination of acetic acid, or by the action of fuming nitric acid on chloral hydrate.

In deliquescent crystals, melting at 55° C. (lower if moist), and boiling at 195° C., very soluble in water, alcohol and ether.

Uses.—A quick escharotic for venereal and other warts. The application of a crystal produces a dry adhering eschar which is quickly thrown off. There is said to be no secondary inflammation. For use as an astringent lotion or gargle, 1 to 5% aqueous solution may be used, and as strong as 1 in 1 or 2 of glycerin with a little iodine and potassium iodide has been employed for temporary application. In ear work it is employed for the closing of perforations—a few applications once a week.

In chronic gonorrhœa, solution 1 in 4, is applied on a tampon by means of an endoscope; less painful than silver nitrate. Also, diluted, for epistaxis. Tobacco stains on the teeth can be removed by its cautious use (25% solution).

In old chronic urethritis resisting treatment, 5% in glycerin often very beneficial.—Pr. April/09,547.

Tonsils, Diseases of. Where operative treatment is not permitted, the use of Trichloracetic Acid applied on a right angled wool-carrier and passed deeply into the crypts, is of value in reducing the size of the tonsil and adding to the comfort of the patient.—M.A.1911,631

In Rigg's disease—incipient stages—this acid applied to the gum after cleaning with Hydrogen Peroxide Solution 10 or 20 Volume is a good remedy—even curative. The action is probably dual—killing the infective organisms and dissolving the Calcium Carbonate of the tartar. With the disappearance of the tartar the presence of bacteria is excluded. Should be tried before sound teeth are sacrificed.

For its use as a delicate test for albumin, *v.* Albumin Tests. *Vol. II.*

ACIDUM CINNAMICUM.

Cinnamylic Acid.—*Syn.* **Phenylacrylic Acid.**

$C_6H_5CH : CH.CO.OH = 148{\cdot}109$.

Dose.—Per os, $\frac{1}{20}$ to $\frac{1}{4}$ grain (**0·003 to 0·016 Gm.**).

Intravenously (in oily emulsion) $\frac{1}{50}$ to $\frac{1}{20}$ grain (**0·0013 to 0·003 Gm.**).

May be manufactured by the oxidation of Cinnamon Oil or by acting upon Benzaldehyde with Acetyl Chloride. In transparent micaceous crystals, melting at about 130° C., very slightly soluble in water, soluble in alcohol, ether and oils.

Preparation of synthetic and artificial acid. Tests and reactions.—P.J i./10,727

Owing to its power of stimulating leucocytosis—the main source of 'complement,'—Cinnamic Acid probably supplies indirectly (as yeast does directly) the necessary quantity of complement for combating infectious diseases.—Bosanquet.

Sodii Cinnamas.—*Syn.* HETOL.

$C_6H_5CH : CH.CO.ONa = 170{\cdot}101$.

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**), *per os,* or hypodermically as Glycerin Solution *v. infra.*

Soluble 1 in 11 water, in glycerin 1 in 10 (*secundum artem*).

Pulmonary tuberculosis has been well treated by intravenous injection of 0·1 Gm. in 10 Cc. normal saline over prolonged periods (Landerer).

The cinnamates have vasodilatory action (Oliver), and in this direction are harmless even on prolonged use.—L. ii./05,206.

Cystitis and influenza have been beneficially treated with it.

Glycerinum Sodii Cinnamatis.

Dose.—30 to 60 minims (**2 to 4 Cc.**) by injection.

This 10 per cent. solution in sterilised glycerin is made by heating to not exceeding 180° C. (356° F.) and is employed for hypodermic and intravenous injection in tuberculosis and cancer. It causes a general leucocytosis.

The late L. Drage obtained good results from the use of the Glycerin solution, and recovery in two cases of basal meningitis almost certainly tubercular. Children tolerate doses of 10–15 minims daily,—given subcutaneously in the back of the neck.—*c.f.* B.M.J. ii./09,242. This authority also employed the injection in numerous other infective cases. Diphtheria improved under its use.

✱ **Sterules of Glycerole of Sodium Cinnamate** contain 30 minims (**2 Cc.**) each.

Strontii Cinnamas $(C_6H_5.CH : CH.CO.O)_2Sr = 381{\cdot}832$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

A white powder, soluble about 1 in 120 of water and about 1 in 50 of a mixture of glycerin and water equal parts, and about 1 in 100 of alcohol 90%. This has been used similarly to the Sodium Salt.

Sodium Phenyl Propiolate.—*Syn.* THERMIOL, $C_6H_5C \vdots C.COONa = 168{\cdot}085$ (+ Aq.)

Is supplied in commerce in 25% solution. Has been used in laryngeal and pulmonary tuberculosis by inhalation of 0·5 to 3% solutions. Note the treble linkage in the side chain indicating a physiologically more active body than the parent Cinnamic Acid.

Cinnaldehydum.—$C_6H_5CH : CH.COH = 132{\cdot}109$. *Syn.* **Cinnamal, P. Austr.** *Dose.*—1 minim (**0·06 Cc.**).

The aldehyde from cinnamon oil. A colourless liquid with cinnamon odour. Sp. Gr. 1·054 to 1·056. ***Soluble*** in alcohol in all proportions.—**Capsules (gelatin) of Cinnamic Aldehyde,** 1 minim, have been largely used with benefit in malignant disease.—L. ii./07,690. Drage reported of value in all forms of tuberculosis, especially in pulmonary cases.

Acidum Coumaricum.—*Syn.* *o*-**Hydroxycinnamic Acid.**

$C_6H_4OH.CH : CH.COOH = 164{\cdot}109$.

Manufactured by heating coumarin 10 parts with a solution of 3·5 parts of sodium in 65 parts of absolute alcohol. The solution is then diluted with water and evaporated to small bulk. The acid is liberated by means of dilute hydrochloric acid. It is removed and dissolved in sodium carbonate. The sodium salt in solution is then freed from coumarin by shaking with ether (coumarin remaining unattacked can thus be recovered and used up again). The acid is then thrown out again with a little dilute hydrochloric acid and is purified by recrystallisation from alcohol.

Ortho-coumaric acid forms brownish crystals, melting at 200° C. the meta- melts at 191° C., and the para- at 206° C.

It was thought that the sodium salt of this hydroxycinnamic acid would prove more powerful than the cinnamic salt which had already yielded good results in the treatment of malignant diseases (see Glycerinum Sodii Cinnamatis). This opinion was deduced by comparing the action of salicylic acid (hydroxybenzoic acid) with that of benzoic acid (introduction of the **Hydroxyl** grouping). Furthermore it may be noted that ortho-coumaric acid stands in the same relationship to salicylic acid as cinnamic does to benzoic acid—introduction of the **Acrylic** grouping.

Soluble very slightly in chloroform, in alcohol 1 in 12 or less, in ether 1 in 36, hardly soluble in water.

The Rideal-Walker coefficients to *B. typhosus* for the acids in 40% alcohol are : ortho- 6·5 ; meta- 4·5 ; para- 4·0.—J. T. A. Walker.

Uses.—For general treatment and as a precursor to and after operation (for three months if necessary) in malignant disease. The sodium salt is not so painful on injection as the cinnamate. It has considerable action in the prevention of the proliferation of cells in cancer. It produces a marked leucocytosis.

The coumarates have action of vasodilators, and they may be taken for prolonged periods without harm.—Oliver, L. ii./05,206.

Sodii Ortho-Coumaras. $C_9H_7O_3Na = 186{\cdot}101$. This salt is best used in the form of

Injectio Sodii Ortho-Coumaratis; a 22% aqueous solution.

Dose.—25 minims (1·5 Cc.).

Injected thrice weekly when possible between the malignant growth and healthy subjacent tissues or in the course of lymphatics proceeding from the region of the growth, or over a large serous sac like the peritoneum.—*c.f.* also B.M.J. i./05,1143.

This solution is a clear yellow liquid perfectly stable. If desired, stronger solutions may be prepared, as the salt is very soluble in water.

In glandular and early cases of pulmonary tuberculosis brilliant results have been obtained with this injection. In cancer, greater difficulty is experienced, owing to the variation of the disease; but very few drugs exert more definite action.—Drage.

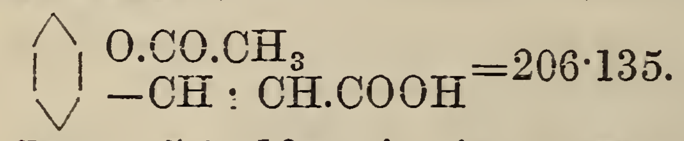
Cancer, inoperable in a man of 74, well treated by this salt and sodium cinnamate with 'X' ray irradiation. Papilloma on middle third of left vocal cord similarly, with result that pain disappeared, voice improved, which previously had been quite out of control.—B.M.J. ii./08,1147.

Sodium Ortho-Coumarate Sterules contain 25 minims of the above injection. They are also made with **Kerocain** $\frac{1}{5}$ grain; also with **Kerocain** $\frac{1}{5}$ grain and **Adrenalin Solution** 10 minims. Drage obtained good results with this injection.

'Fibrocoumarin' Sterules contain **Sodium Orthocoumarate** injection 25 minims, **Thiosinamin** 2 grains and **Kerocain** $\frac{1}{5}$ grain. This is especially suitable where tissue is cicatricised.

'Fibrocoumarin' Sterules with **Adrenalin Solution** 10 minims. Excellent results have been obtained by injection of this preparation into the growth. Drage stated it is the most active local agent he had used. *c.f.* also **Cicatricine** for a simple solution of Thiosinamin.

***Tylmarin** (T. M. 283966). *Syn.* **Acidum Acetyl-*o*-Coumaricum.**



$$C_6H_4\begin{cases}O.CO.CH_3\\ -CH:CH.COOH\end{cases}=206{\cdot}135.$$

Dose.—5 to 10 grains (0·3 to 0·6 Gm.) thrice daily after food.

Colourless crystals melting at 150° C.

This substance constitutes a stage further in the Cinnamic and Coumaric treatment. In view of advantages that acetyl-salicylic acid has over salicylic acid, ortho-coumaric acid has been acetylated.

Soluble only slightly in water (easily in presence of alkali, but dissociation occurs), in alcohol 90% 1 in 19, in ether 1 in 50, in chloroform 1 in 16.

Uses.—More essentially for malignant disease, but also for tuberculosis and as a general intestinal antiseptic.

Any early case of glandular or pulmonary tuberculosis which can be cured by open-air treatment can be successfully treated with this drug accompanied by injections of Sodium Orthocoumarate, or Sodium Cinnamate,—it is a valuable adjuvant (Drage). Given *per os* it probably undergoes hydrolysis into *o*-coumaric acid and acetic acid.

The carbolic acid (Walker-Rideal) coefficient of Tylmarin in 40% alcohol with *B. typhosus* was found to be 4·5.—J.T. Ainslie Walker.

Tylmarin Cachets and Tablets contain 5 grains (0·3 Gm.).

Tylmarin Dusting Powder has been used with promising results to cancerous growths which have broken down. Large open sores can be materially benefited.

Tylmarin Gauze in one yard pieces is prepared for packing for local use.

Tuberculous ulceration well treated with Tylmarin.—L. ii./06,1292.

The diminution in size of lymphatic glands secondarily infected has been very marked, and fresh invasion is prevented.

Prolongation of life and increase of comfort to the sufferer from phthisis.—L. ii./07,690.

No toxic effects have been experienced in the use of any of these methods. A patient with sarcoma in the palate, rendering him practically deaf, received 3 injections of Sodium Coumarate and 5 grains of Tylmarin twice daily. Condition immensely improved. Two cases of carcinoma of the œsophagus improved, also cases of carcinoma of the breast. Success is more likely with definite chemicals than with undefined ones.—Drage, L. ii./08,1367.

Tylmarin Sodium, *Syn.* SODII ACETO-COUMARAS.

$C_6H_4O.CO.CH_3.CH : CH.COONa=228·127.$

Dose.—5 grains (0·3 Gm.).

This substance would be decomposed in the stomach yielding Tylmarin in a nascent condition as initial product. Needle crystals very *soluble* in water (1 in less than 1) and in Alcohol (90%) 1 in 2. Might also be tried by hypodermic injection.

Tylmarin-Quinine. *Syn.* QUININÆ ACETO-COUMARAS.

$C_{20}H_{24}N_2O_2. C_6H_4O.COCH_3.CH : CH.COOH=530·447.$

Dose.—3 to 5 grains (0·2 to 0·3 Gm.).

White powder containing approximately 60% Quinine and 40% Tylmarin, *soluble* very slightly in water (less than 1 in 800) in Alcohol 90% 1 in 9, in Glycerin 1 in 30. Antiseptic and febrifuge.

Tylmarin-Thorium. *Syn.* THORII ACETO-COUMARAS.

$Th(OH)_4[Th(C_6H_4.O.CO.CH_3.CH: CH.COO)_4]_2=2406·248$

A buff coloured powder containing approximately 35% of Thorium Oxide prepared by double decomposition between Thorium Nitrate and Sodium Aceto-Coumarate. For local use in malignant disease.

We conducted some **photographic experiments** to determine the radio-activity of this substance. It was found that Tylmarin Thorium and Thorium Oleate (*q.v.*) were about equal in activity, both being slightly stronger than the Nitrate.

The compound may prove of value by hypodermic injection. "**Sterules**" are prepared containing 10 minims of a 10% suspension in Sterilised Almond Oil. Suggested for use in malignant disease on the lines of the other Coumaric preparations.

ACIDUM CITRICUM. *(Off.)*

$C_3H_4OH.(COOH)_3, H_2O=210·11.$

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

Colourless crystals or white powder, 99·5% pure.—*Off.* and U.S. Lemon juice contains as much as 7 to 9%(30 to 40 grains per ounce).

Soluble.—2 in 1 of water, 1 in 2 of glycerin, 1 in 1½ of alcohol (90%), 1 in 8 of ether, Sp. Gr. 0·735, but much less soluble in 0·720 ether.

For quantities of alkalis to be prescribed with this acid in the form of effervescing mixtures, *vide* NEUTRALISATION TABLE.

Uses.—Relieves thirst in fever. Lemon juice is better than citric acid for scurvy. A useful method of preserving it is to boil the juice, place in stone bottles whilst hot, and cover with a little oil before plugging with a cork. Will keep for months.

In rheumatism and given internally in jaundice.—H.

Diminishes coagulability of the blood (Sir A. E. Wright). Apparatus devised showing, however, that neither the acid nor lime salts had any effect on the coagulation time.—(Addis) B.M.J. i./09,999. *Vide* also p. 248 *et seq.* and *Vol. II.*

Incompatible with potassium tartrate and alkaline carbonates

Impurity.—Lead should not exceed 20 parts per million (*Off.*)

Lotio Acidi Citrici et Phenolis. Citric Acid 3 drachms, Phenol ½ ounce, Water to 1 pint. As an antiseptic tartar solvent, *e.g.*, in removing septic teeth.—L. ii./09,1666.

℗*ACIDUM CRESYLICUM.

Cresol (*Off.*). *Syn.* **Cresolum Crudum**, CRESYL, PARACRESYLOL, CRESYL HYDRATE, METHYL PHENOL, METHYL HYDROXYBENZENE &c., $C_6H_4.OH.CH_3$ = 108·099. KRESOLUM CRUDUM P. HUNG, is "ACIDUM CARBOLICUM FLAVUM 100%."

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

A yellowish brown liquid with tar-like odour.

A mixture of ortho-, meta-, and paracresols, forming the principal constituent in crude carbolic acids. **Ortho**-cresol (1 : 2) melts at 31° C. and boils at 188° C. **Meta-** (1 : 3) is a colourless liquid, boiling at 201° C. **Para-** (1 : 4) melts at 36° C. and boils at 198° C. FR. CX. requires, in the following proportions : Ortho, 35 ; Meta 40. Para 25. The commercial article is much less soluble in water than Phenol and is not so poisonous. It is used for vaporising in whooping-cough.

Sp. Gr. 1·045 to 1·05. When distilled 90% should boil at 195 to 205° C. A note on the varieties.—P.J. i./07,261.

P.G.V. requires at least 50% *m*-cresol $C_6H_4.OH\ (CH_3)$. (1 : 3) also that at least 92% must distil between 199 to 204° C.

Method of estimating by converting into Trinitro-*m*-cresol is given.

Separation of m-and p-Cresol.—Process depends on the fact that only Calcium *m*-Cresoxide is decomposed when the Calcium Salts of *m*- and *p*-Cresol are treated by superheated steam at 105—110° C. *m*-Cresol alone distils over.—Terrisse and Dessoulavy (D.R.P. 267210), ex J.C.S.A. i./14,38.

Soluble 1 in 50 water (B.P., 1914), we find mostly 1 in 70. Miscible with alcohol 90%, chloroform, ether, castor oil, and glycerin in all strengths. Also miscible with almond and olive oil in all proportions, but to make a clear solution we found about 1 in 2½ necessary. Used ı making Liquor Cresoli Saponatus, *q.v.*

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* But see p. 13.

Cresol Paste.—A 20% Paste or Ointment of pure Tricresol in a basis of Lanolin 6 and White Wax 1 was recommended by Sir Watson Cheyne early in the war for *initial use* at the front to wounds soon after infliction. His advice was that the wound should then be opened up and thoroughly cleaned out and disinfected with the customary peroxide, carbolic acid, etc., as soon as the patient had been brought to the first convenient place. In addition Sir Watson Cheyne advised the use of Borsal (*q.v.*). The method unfortunately in a few initial cases proved unsatisfactory. The criticism of it by the opposing school (see in particular L. ii./16,503, *et seq.*) can hardly be dealt with. We provide further details on the Paste under "Wounds" in the Therapeutic Index.

Disinfectants.

Certain names and phrases occur regarding the constituents of disinfectants which should be grasped :—

"*Tar Acids.*"—Oxygenated Hydrocarbons including Phenols, Cresols, and higher Hydroxy compounds.

"*Phenoloids.*"—A vague term around which much mystery has existed *e.g.*, according to L. ii./09,1455.—These bodies appear to contain a larger proportion of hydrogen to carbon than the members of the phenol series and less than members of the cresol series. They probably consist of a mixture of oxidised hydrocarbons, but this view is not held by all, they are thought by others *to be identical with Phenols.*

"So-called Phenoloids or tar-acids are in no sense mysterious compounds—*they simply consist of phenol and its higher homologues—the term Phenoloid is unfortunate and misleading.*"—P.J. ii./10,171. This view with which we concur has apparently not been disproved.

"*Tar Oils.*"—The neutral bodies present, *i.e.*, insoluble in soda.

"*Coke Oven Oils.*"—Contain varying percentages of "Phenoloids" with "Tar Oils."

The following are representative Cresylic Disinfectants :—

Ⓟ***Liquor Cresolis Saponatus.** (*Off.*).

Mix Cresol 50 by weight with Castor Oil 35 by weight. Heat to 80° C. Dissolve Potassium Hydrate 8 in Water 7, mix and heat until 1 vol. mixes clear with 10 of Water. Cool and add Water to 100 by volume.

Many formulæ on these lines have been published—some employing Linseed Oil as in the original Lysol formula. Others proceed at ordinary temperature without heat, making the Potash Soap first by shaking, adding a proportion of Alcohol and finally the Cresol little by little. Others again, *e.g.* the *U.S. IX*, suggest the use of an equivalent smaller proportion of *Soda* instead of Potash. We have conducted many experiments on this matter and have no hesitation in saying *the B.P. method is bad to beat.*

To make a *clearly* soluble article it is important to use the best potash available and the best Cresol, otherwise on diluting with the water the preparation will not be clear. Soda and Castor Oil will produce a clearly soluble Liquor Cresolis if the Soda be of the finest quality, but from our experiments we do not favour the suggestion to use soda for a preparation of this kind.

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* But see par., p. 13.

R. C. Cowley, C.D., June 16/17, mixes cresylic acid and oleic acid, the alkali value of the latter being previously determined. The preparation is completed by shaking with the required amount of sodium hydroxide and making up to volume. All materials to be the best quality. *See* also F. M. Jordan, Am. Jl. Ph. 19,83: Y.B.P., 19,282.

The *Off.* liquor is *clearly soluble* in water. A miscible preparation is now preferred. (The day is not so far distant when such preparations were thought more potent if they formed a *milky emulsion* with water!)

The disinfecting power of the higher phenols increases in proportion to their position in the homologous series, but their solubility *decreases* proportionately. Bodies, therefore, with the *hypothetical* diphenyl nucleus which have become so popular can only be used as *emulsions* made with vegetable or with Tar Oils, glue, etc. The use of Alcohol to dissolve reduces activity.—Hewlett, L. i./09,893.

The **Lysol Patent** specification, 1017/1890 (expired) gives the following (*c.f.* also p. 36):

(i). Tar Oil 100 Gm., Linseed Oil 100 Gm. Caustic Potash Solution (1 in 2) 75 Gm., Alcohol 65 Gm. Boil with reflux condenser until saponified.

(ii). Tar Oil 40 Gm., Common Resin 10 Gm., Caustic Potash Solution 70 Gm., Alcohol 70 Gm.

N.S.D. p. 1466, says *re* Lysol, the 190-200° C. fraction from Tar Oil is dissolved in fat and saponified after in presence of Alcohol.

The old name, '**Commercial Carbolic Acid**' is now little used. It implies Cresylic Acid containing about 95% cresols in a more or less refined condition according to the care taken in distillation—with but little phenol.

Post-influenzal cough cured by inhalation of Lysol—about 1 drachm to 4 ozs. of boiling water.—C. Higgens, L. i./15,1204.

Antidotes—Egg albumen, oil, butter. On no account give water.

Proprietary Disinfectants (arranged alphabetically).

Ⓟ*✱**Acrosyl** (T.M. 358720, Class 2).—A saponified Cresol preparation containing 50 to 55% Cresols.

"C" Disinfecting Fluid. A cheap coal tar preparation (the exact composition not made public) employed *un*diluted found to be a very active disinfecter. It was devised at the Pathological Laboratory at Cambridge. The Medical Department of the Navy found it excellent for disinfecting corpses of men and animals in the Dardanelles. It kills flies by spraying them and acts as a deterrent.—L. i./17,354.

Ⓟ*✱**Cofectant** (T.M. 349583) has the following composition: Phenols or Phenoloids 66·27, Resins with fatty Acids 24·66, Water 6·4, Potash 2·67% (Total neutral excipients 33·73%).—L. ii./09,1457.

According to the "*Lancet*" Commission (*vide Vol. II.*) it had the highest C.A. Co-efficient when examined by its method.

Cofectant Lozenges for bacillary and coccigenic infection of the respiratory organs are made.

Ⓟ*✱**Creolin** (T.M. 84764 and 87839) **Pearson** (20% Cresylic Acid).

Ⓟ***Creophen** (Ferris) is described as a Coal Tar product for use as a medical and surgical antiseptic, deodorant, and bactericide. It possesses hæmostatic power and is non-irritant. It forms a white emulsion with water.

✱**Cyllin** (T.M. 256051, 258990, 259683, 299502) **Medical.** *Dose.*—1 to 5 minims (**0·06 to 0·3 Cc.**):

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* But see par., p. 13.

Is stated to contain 60% of members of a series of oxidised hydrocarbon, having a diphenyl nucleus in place of the single phenyl found in carbolic acid; it is neither caustic nor toxic, emulsifying with water, and is a deodorising bactericide. Its Rideal-Walker carbolic acid co-efficient for *B. typhosus* is 20.

According to the Manufacturers, Cyllin does not contain so much as 3% of Carbolic acid or its homologues.

For lotions 1 to 200; as a douche 1 to 400.

As ointment 5% with Adeps Lanæ for erysipelas, eczema, and scabies, ✱**Lano-Cyllin** (T.M. 264589) is supplied.

Lotio Creolin—St. Th. H., Cyllin 1, Glycerin 8, Water to 160. St. J. H., 1 in 320 without glycerin, 1 to 2 drachms in a pint of water.

Capsules—1 and 3 minims keratin-coated, have been used in summer diarrhœa, dysentery, colitis and sprue. 'Stomachic' are also supplied.

Cyllin Dusting Powder.—Substitute for iodoform. **Gauze**—10% 1, and 20 yards rolls. **Inhalant**—Antiseptic. For use in phthisis with an air inhaler. **Pastils** — contain $\frac{1}{10}$ minim in each. **Plaster**—5%. **Rectones**—(Suppositories). **Soft Soap**—Contains 5%; **Surgical Soap**—10%, **Liquid Soap** is also made.

Ⓟ**Fluid Cyllin Disinfectant,** *i.e.* less refined than Medical Cyllin is also made.

Unguentum (Creolin) Cyllin Compositum—St. J. H., Cyllin ½, Soft Soap 1, Ammoniated Mercury Ointment 4, Soft Paraffin 8.

Cyllin Syrup.—*Dose* for adults 10 to 60 minims, for infants 5 to 10 minims. In infantile diarrhœa encouraging.—L. ii./06,1078.

Poisoning by Cyllin in an infant. Apomorphine $\frac{1}{20}$ grain produced vomiting. Artificial respiration necessary for three hours after lavage with Albumen. Water and Strychnine hypodermically to restore consciousness.—B.M.J. i./09,18.

In chronic eczema 1 in 200 with Lotio Calaminæ Oleosa.—B.M.J. i./09,1341.

As a mouth, œsophageal and stomach antiseptic. Cyllin Pastilles keep the mouth clean after tonsillotomy and removal of the uvula.—H. Mac Naughton-Jones, Dental Record, Aug. 1890, Brit. Gyn. Jl. 1903.

The Rideal-Walker Co-efficient for Cyllin in respect of *Staphylococcus Pyogenes Aureus* is 9·37.

Ⓟ**Diffusol, Lysol-Martindale.** A soapy solution containing 50% specially purified ortho-, meta- and para-cresols soluble in either hot or cold water in all proportions. For general surgical use dilute to 1%. For instruments 2%. For utensils 5%.

The diffusible and penetrating properties of this preparation were referred to in the Hunterian Oration by Sir Watson Cheyne, Royal College of Surgeons, Feb. 15th, 1915. The presence of 50% of cresol can be confirmed by decomposing it with calcium chloride and caustic soda. On filtration the cresols are obtained in alkaline solution, from which they are readily separated by the addition of an acid.—L i./15,918.

The penetration diffusibility is determined by means of **Edmunds' Cell**—an ingenious apparatus employing a slab of Agar culture medium with the Test organism brushed on one side and the antiseptic to be tested on the other. The area of no growth corresponds with diffusibility and penetration of the antiseptic. Diffusol was found superior to foreign made Lysol.—L. i./15,426.

✱**Hycol.** (T.M. 35595, Class 2).—A general disinfectant stated to contain 28% "Phenoloids" emulsifying with water. Carbolic Co-efficient on *B. Typhosus*—by the Rideal-Walker method is stated to be 18-20. The preparation is said by the makers to be "non-poisonous."

Hycol Medical is also made. *Dose* internally: 1 to 3 minims in cholera. A tar product containing 38% "Phenoloids" (200° to 305°) C.A. Co-efficient on *B. Typhosus* is indicated as 24-26. It is stated to be non-poisonous. It is used in dilution 1 in 10,000, *e.g.*, in blepharitis to as strong as 1 in 5, *e.g.*, in favus and lupus. In diphtheria as spray 1 in 1,000, in gonorrhœa 1 in 1,000 to 1 in 200; to wounds 2 to 5%. In gynæcology 1 in 400.

✱**Izal*** (T.Ms. 171127, 300079, Class 2; 171812, Class 3) (**Medical**) *Dose.*—15 to 60 minims in ½ to 1 ounce milk or water.

An emulsion containing 45% Izal Oil—a "Coke Oven Oil," used as a non-poisonous disinfectant and antiseptic, 1 in 200 of water. Is stated to contain Phenoloids. It is destructive to *B. coli* and other organisms, and has been used pure in ringworm. Internally in cholera. In an epidemic a stock emulsion with Tragacanth mucilage, made of strength 1 drachm = 15 minims is useful.

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* Makers say not Ⓟ.

Izal has the advantage of mixing with all kinds of water whether strongly saline or otherwise. This is particularly noticeable on mixing Izal with urine, with which it forms a complete emulsion. In the case of soapy disinfectants the oily cresyl portion may be thrown out—or indeed the soap itself.

Capsules of Izal (plain), 2 minims and Izal 2 minims **with Cod Liver Oil** 5 minims are supplied for use in phthisis.

Izal, with Bismuth Subnitrate and Chloromorphia Solution, is useful in dysentery.

Izal Fluid containing the same amount of impure Izal Oil is also supplied. Strength of 1 in 400 disinfected *Staphylococcus pyogenes aureus* in pus in 15 minutes—in a simple broth culture 1 in 600 will do the work in 5 minutes.

Ⓟ✱**Jeyes Fluid Disinfectant** (T.M. 66985, 84764, Class 3; 42495, 51937, 63869, 81826, 81977, 186844, 204987, 206486, 218513, Class 2) to be disinguished from Cyllin (medical). It contains cresols, with resin soap. Solutions (1 and 2%) as antiseptic lotion, and injection 1 in 400 is said to be of value in gonorrhœa, also in ozæna.

Ⓟ✱**Jeyes Soluble Fluid** (✱**Jeysol.** T.M. 385267, Class 2) differs from the Fluid Disinfectant in mixing clear with water. It contains 50% of refined Cresylic Acid For instruments 1% dilution is efficient.

Cresol Soap Solution made with Jeyes Fluid 1½ ozs., Soft Soap 1½ lbs. Water 10 gallons, used for the body and clothes—allowed to dry on; effective against vermin.—S. Monckton Copeman, L. i./15,273.

Ⓟ***Kelvolin**—40% Cresylic Acid.—L. i./04,369.

✱**Kerol** (T.M. 275140, Class 2).—Composition not stated, though it is described as containing no Carbolic or Cresylic Acids and as non-poisonous. It is claimed to be a non-irritant germicide; is said to have a Carbolic Acid Co-efficient from 18·0 to 20·0 on *B. Typhosus* (Rideal-Walker Method). R. T. Hewlett reports this preparation slightly less toxic than Lysol—*vide* Med. Times, June 27, 1908.

1 in 180 is germicidal to Tubercle Bacilli in three hours even when dried.—W. G. Savage. **Kerol Capsules** are used as intestinal antiseptics.

Ⓟ*✱**Klondol** (T.M. 364070, Class 3, and 364147, Class 2). Described as a safe disinfectant for internal use, and for douching in 1% solution. Forms a clear solution with water.

Ⓟ***Kresapol** (Ferris) is a Cresylic Acid Disinfectant made with Potash Soap. It is miscible with water in all proportions. For all forms of antiseptic cleaning.

Ⓟ*✱**Lycryl** (T.M. 363298, Class 3, and 363297, Class 2). Antiseptic containing 50% Cresols.

Ⓟ*†**Lysol.**—A dark alkaline liquid containing about 50% Cresols (*c f.*, p. 34).

Miscible with water. Prepared by mixing Oil of Tar with Linseed Oil or with a fat and saponifying the mixture with Caustic Potash and Alcohol.—

Incompatible with acids.

Poisoning by.—B.M.J. i./00,1498. B.M.J.E. ii./98,63; ii./01,173. 100 cases B.M.J.E. ii./06,80. By drinking 3 ounces; stomach washed out about a dozen times with tepid water. Recovery under external stimuli.—B.M.J ii./08,1495.

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* But see par. p. 13.

† Trade Mark 98948, removed from Register (avoided) under Patents, Designs and Trade Marks (Temporary Rules) Act, 1914, but Lysol *Device* 98947, registered by the original owners of the preparation remains. *c.f.* Patents, etc. (Temp. Rules) Act, 1914.

Lysol was the name of an article made according to an expired patent. When a patent expires the name of the patented article becomes public property. The name, however, remained on the Trade Mark register until removed under the Patents, Designs and Trade Marks (Temporary Rules) Act, 1914.—C.D. Feb. 20/15.

Apparently about ½ ounce taken. Recovery after vomiting and a dose of Magnesium Sulphate. The copious vomiting and 3 glasses of milk which had been taken were probably the saving clause. Lavage not conducted.—B.M.J. i./13,19.

Antidotes—Egg Albumen, Oil, Butter—on no account give water except by lavage.

Ⓟ*✱**Microbene** (T.M. 299709, Class 2). (Note.—Microbane is a Trade Mark, L: 321733, Class 3.) Contains 50% Cresylic Acid. Has substantially the same R.W. value as "Hamburg" Lysol.—R. T. Hewlett, C.D. Oct. 17, 14.

Ⓟ***Mycetol.**—A water-soluble Disinfectant similar to Lysol containing 50% of Cresylic Acid. It has a Carbolic Acid coefficient of 2·2; it does not irritate the skin and does not corrode instruments.

Ⓟ*✱**Pacolol** (T.M. 328,009)—Described as resembling Liquor Cresol Saponatus. It forms a clear solution in Distilled Water. For surgical use dilute 1 tablespoonful to 2½ pints. Carbolic Co-efficient with *B. Typhosus* 3·18 and using *B. Coli Communis* 2·25.

Ⓟ*✱**Pathone** (T.M. 390037, Class 2, and 349594, Class 3) contains 50% Soluble Cresols; stated to be twice as powerful as Phenol.

Ⓟ * **Phenoloid Disinfectant,** *Martindale,* contains 66% of "Phenolloids," and has "*Lancet*" C.A. Co-efficient 7·8. It emulsifies with water. An emulsion, *e.g.*, 5% in water mixes perfectly with urine and other Saline matters.

For mucous membranes 0·1% or 10 minims to the pint approx. is efficient.

For general disinfection—utensils, drains, cloths, etc., 1 in 200 to 1 in 500—the stronger (1 tablespoonful to 5 pints), to be used where practicable.

For coughs and throat irritation 20 minims added to 1½ pints of water at 149° F. and inhaled, *e.g.*, in a Portable Inhaler.

Phenoloid Tablets.—*Martindale.*

These are prepared of two strengths, respectively ⅛ and ¼ grain of "Phenoloid" corresponding in activity to 1 and 2 grains respectively of Carbolic Acid. They are flavoured with Lavender. We took occasion recently to examine the efficacy of these Tablets as an antiseptic and prepared "plates" from the saliva before and after sucking a tablet. The diminution of bacteria was remarkable.

Uses.—To be slowly dissolved in the mouth in tonsilitis, chronic laryngitis, stomatitis, and in dyspepsia, gastritis and diarrhœa.

Ⓟ*✱**Toxol** (T.M. 353560, Class 2, and 363280, Class 3).—A saponaceous Solution of cresols 2½ times as powerful as Phenol.

Ⓟ***Trikresol,** a specialty which is a purified mixture of the three cresols. It is a clear, colourless, oily liquid, soluble about 1 in 40 of water, and is said to have three times the germicidal power of Phenol. For surgical use, ½ to 1% solution. As an eye wash 1 in 1,000 or 2,000.

Ⓟ**Trikresol-formalin.** These substances in proportion of 4 to 1 form a useful application as a dental dressing.

Bacteriology of the tooth-brush, 1% Trikresol said to be an effective method of rendering the tooth-brush free from the common pathogenic organisms.—L. ii./11,380.

Ⓟ*✱**Typhol** (T.M. 315937).—Described as a Cresylic disinfectant with a uniform Co-efficient of 3.

Ⓟ* **Xykol.**—A substitute for Lysol containing 50% Phenol derivatives, and forming a clear solution with water.

Para-Chloro-Orthocresol in a soap and spirit mixture patented. More potent than Carbolic Acid.—F. W. Howorth, P.J. ii/15,234. See also B.M.J., ii/09,213.

For the Lancet and Rideal-Walker methods of standardising Disinfectants, B.P.Co f. Discussion and recent modifications of the methods, see Vol. II.

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* But see par., p. 13.

ACIDUM FORMICUM.

Syn. **Aminic Acid.** H.COOH=46·021.

Dose.—2 to 10 minims (**0·12 to 0·6 Cc.**) freely diluted, *e.g.*, with mineral water. (Much larger doses have been given.) Hypodermically 2 to 15 minims of 1 in 1,000 dilution. (In some instances much weaker dilution, *e.g.*, 1 in 10,000 with same dose.)

A colourless liquid Sp. Gr. 1·061—1·064 (24 to 25% H.COOH). Miscible with water. In concentrated form has a caustic action.

Note :—Formic Acid is obtainable also of Sp. Gr. 1·12=50%, 1·15 =65% ; 1·2=85% ; 1·22=100% H.COOH. As a rule the 25% Acid is referred to.

Uses.—It is alleged that this acid (acting in a manner similar to cantharides) gives tone to the muscles and restrains muscular tremor, as in cases of paralysis agitans, and in chorea. It increases muscular energy and abolishes the sense of fatigue. It is employed usually as one of the salts, *e.g.*, in influenza, gout, rheumatism, tremors, etc.

In a case of severe rheumatoid arthritis known to us initial hypodermic dose of 5 minims of the 1 in 1,000 solution caused such intense irritation that the treatment (with a stronger dosage) could not be proceeded with. The Sodium Salt would be preferable.

Nystagmus has been well treated by 5 minim doses of the 25% Formic Acid.—Pres. Jan. 1911, p. 4.

This acid was originally made from the Red Ant, *Formica rufa*. The stinging nettle, *Urtica dioica*, contains formic acid, and has long been employed as a tonic and diuretic.

Succus Urticæ is prepared in strength 1=1.

Dose.—1 to 4 drachms increased if desired. The juice expressed from the fresh plant, preserved with 25% of 90% Alcohol.

Formic Acid is stated to be produced by the growth of *B. rheumaticus* and is a considerable constituent in sweat. *c.f. Vol. II.*

Rheumatism it is said has been cured by applying bees to joints. Beekeepers it is said are remarkably free from rheumatism.

As a *food preservative* 0·1 to 0·15% pure Formic Acid suffices. It has been suggested as substitute for Citric, Tartaric and Phosphoric Acids in the Mineral Water trade. 3 ounces of 'Alacet' (60% Acid) for 1 gallon Lemon Syrup. The taste is equal to Syrup made with Citric Acid.

Sodii Formas, H.COONa=68·013.

Dose.—$\frac{1}{6}$ to 3 grains (**0·01 to 0·2 Gm.**) in solution, increased if desired to as much as **4 Gm.** per diem.

A white alkaline powder soluble in water.

A strong reducing agent and powerful antiseptic. *Incompatible with Acids.*

Manufacture.—C. H. Hampshire and W. R. Pratt recommend the Salt to be anhydrous. It can be made by evaporating nearly to dryness on a steam bath and drying at 130° C., or preferably by allowing a solution saturated at 123° C. to cool with constant stirring to 30° C. and drying the crystals at 115° C.—Y.B.P., 1913,546.

T. Tyrer and F. C. Gosling found $2H_2O$ in the crystalline salt.—P.J.ii/12,157.

Uses.—In cases of heart and kidney diseases it lessens the loss of albumin by the urine, although it has diuretic powers. Does not disagree with the stomach. Said not to be toxic. Has been employed in phthisis and in pneumonia. Improves appetite, mental and physical activity.

Ocular fatigue has been treated with sodium formate instillation 1 in 50 to 1 in 30. Rheumatism improved by 15 grain doses.—B.M.J., ii./07,184; ii./08, 1059.

Sterules of Sodium Formate contain $\frac{1}{8}$ and $\frac{1}{2}$ grain.

In diphtheria 400 cases treated with 5 to 10 minim doses of 25% solution in water every 4 hours, were satisfactory, general improvement noticeable.—Edin. Med. Jl., June, 1907.

Elixir Sodii Formatis. *Dose.*—2 drachms (**8 Cc.**).

Sodium Formate 4, Essence of Vanilla, *q.s.*, Simple Syrup, *q.s.*, to 100.

Calcii Formas, $(H.COO)_2Ca = 130{\cdot}096$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White crystals soluble 1 in 10 of water. More permanent than the Sodium Salt. For hæmorrhages has been found useful.

Sterules of Calcium Formate contain $\frac{3}{4}$ grain (**0·05 Gm.**).

Ferri Formas. (**Ferric Formate.**)

$Fe_3(OH)_2.(HCOO)_7.4H_2O = 588{\cdot}691$.

Dose.—$1\frac{1}{2}$ to 3 grains (**0·1 to 0·2 Gm.**).

Red crystals soluble in water about 1 in 19 at 17° C., but solutions are unstable.—Y.B.P., '13,/554.

Lithii Formas, H.COOLi, $H_2O = 69{\cdot}969$. White crystalline powder freely soluble in water.

Dose.—As much as $1\frac{1}{2}$ Gm. of this salt have been given daily, and of the Sodium and Potassium Salts 3 Gm.—L. i./05,892.

Uses.—Similar to the above and has been given in gout.

Magnesii Formas, Mg. $(HCO_2)_2 2H_2O = 150{\cdot}378$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Colourless crystals soluble in water.

Potassii Formas, $H.COOK = 84{\cdot}113$.

Dose and use similar to the Sodium Salt.

Crystalline powder very soluble in water forming neutral solution. Owing to hygroscopic tendency commercial salt is about 95% pure.—P.J. ii./12,157.

P1 Strychninæ Formas, $C_{21}H_{22}N_2O_2$. $HCOOH. = 380{\cdot}322$.

Dose.—$\frac{1}{64}$ grain (**0·001 Gm.**).

White crystalline powder soluble in water about 1 in $3\frac{1}{2}$. A nerve stimulant and muscular tonic.

It is best prepared in the anhydrous condition by drying at below 85° C.—Y.B.P. 1913,558; P.J. ii./08,339.

Ⓟ Syrupus Formatum Compositus (*Syn.* **Elixir Formatum Compositum**).

Dose.—1 to 2 drachms (**4 to 8 Cc.**). One drachm contains Formates of Sodium and Potassium each 2 grains, Calcium 1 grain. Quinine $\frac{1}{5}$ grain, Strychnine $\frac{1}{100}$ grain; Formic Acid 2 minims, Cochineal and Vanillin Solutions each $\frac{1}{5}$ minim, Lemon Oil $\frac{1}{60}$ minim, Alcohol 90%, Water and Syrup in proportion 1, 1, 6 *q.s.* to 1 drachm

ACIDUM GLYCEROPHOSPHORICUM.

$C_3H_5(OH)_2O.PO.(OH)_2=172·127.$

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**) of 25% acid.

Manufacture.—This dibasic acid forms a colourless, sour liquid, miscible with water and alcohol. It may be prepared by heating Glycerin with two-thirds of its weight of Phosphoric Acid 60%, at not exceeding 105° C. Fumes are given off. The resulting liquid is neutralized with calcium carbonate. The solution of Calcium Glycerophosphate is concentrated *in vacuo* or precipitated by alcohol, collected and dried. This may be converted into the (purified) acid or other salts.

It is usually made 25% strength and has Sp. Gr 1·125. A 50% Acid is also supplied in commerce.

The following are recent patents.—**No. 19,319 of 1911,** by Aug. Zimmermann for Chemische Fabrik auf Actien, Berlin. Glycerophosphoric Acid is made by causing Phosphoric Acid in *statu nascendi* to act on Glycerin by using a Phosphate and an acid substance, either a free acid or acid salt.—P.J. i./12,77. *Now void.*

No. 2806 of 1912, by Southall Bros. and Barclay and C. S. Roy. This process relates to the direct production of pure Mono-glyceryl Ester of Phosphoric Acid. Phosphoric Acid Sp. Gr. 1·75 and Glycerin Sp. Gr. 1·26 are heated at 100° to 105° C. at a pressure of about 30 mm. of Mercury, 24 to 48 hours and the product is further treated for production of Salts. The essential features of the patent are uniform product, not a mixture of several esters. Low temperature employed, *i.e.*, no carbonisation. A good yield of colourless Acid.—P.J. ii./12,20.

No. 2881 of 1912, by the same patentees, relates to the production of Glycerophosphates by mixing Oxides, Hydroxides, Carbonates or Phosphates of Calcium, Barium, Strontium, etc., with Phosphoric Acid, adding the required amount of Glycerin and heating to 140° to 220° C. The further procedure varies according as Acid or Neutral Salt is required.—P.J. ii./12,232.

Uses of the Glycerophosphates.—The Glycerophosphates were originally introduced into medicine by Robin, on the grounds that Lecithin (*q.v.*) an omnipresent, complex fatty body, contains its Phosphorus in the form of the Glycerophosphoric radical. Opinion at that time was to the effect that the Glycerophosphates are assimilated as such and are excreted as phosphates. Prof. W. E. Dixon says that evidence does not support the view, and that such portion of Glycerophosphates given therapeutically that is not excreted unchanged per rectum is almost certainly absorbed as Inorganic Phosphate. Inorganic Phosphates are absorbed at least as readily as Organic ones, *e.g.*, Glycerophosphates. According to him it has been shown that a diet rich in Phosphorus, *e.g.*, eggs, etc., or the administration of either Organic or Inorganic Phosphates produces no marked effect on Protein metabolism. The facts suggest that there is no advantage gained over Inorganic by Organic Phosphates.—Pr. Jan. 1913,120.

It would appear a difficult matter to prove definitely in what form assimilation of a Glycerophosphate takes place. Robin states that the Phosphorus (Glycerophosphate Therapy) is excreted in the urine as Inorganic Phosphate. In practice it would be easy to obtain evidence that the Glycerophosphates act as useful tonics in spite of the pharmacologist's views. Robin held, and the general current opinion is, that these compounds *aid metabolism.* Viewed chemically the Glycerophosphates are labile compounds and for this reason they may be more acceptable to the tissues than Inorganic bodies.

Merck (Jahresbericht, 1911 issued 1912), mentions that the bones of man contain as much as 1200 to 1500 Gm. of Phosphorus in the form of neutral

Calcium Phosphate. The importance of Phosphorus-metabolism is seen in the fact that 3 to 4 Gm. of Phosphoric Acid are passed daily by an adult. This is obtained mostly from vegetable food and to some extent from the decomposition of Nucleins and Lecithins. Increased excretion of Phosphorus is thought to be associated with increased nerve activity. A reduction of the amount eliminated has been seen in various diseases, *e.g.*, arthritis, diabetes, acute atrophy of the liver, kidney affections, etc. The fact of decreased Phosphate excretion in pregnancy shows simply that the fœtus requires Phosphorus for bone formation. Increased output of Phosphorus occurs in digestive disturbance, body fatigue, nerve and bone diseases.

Experiments showed in the use of Phosphorus and Inorganic Phosphates that they have little effect on metabolism. Thus Sodium Phosphate soon appears in the urine when given subcutaneously or intravenously. Internally it acts almost entirely as a purgative. The use of Phosphorus as such has not had great success so far as actual bone formation is concerned.

Consequently with the discovery of Glycerophosphoric Acid in egg yolk, the fact that Lecithin is split up into Choline and Glycerophosphoric Acid in the system, led to the use of the Glycerophosphates in medicine.

It was determined that Glycerophosphoric Acid and its salts represent the condition of Phosphorus occurring in metabolism and which is best for assimilation in the organism. Even large doses of the Glycerophosphates are harmless, whilst small ones possess utility.

Robin held that the Glycerophosphates have a powerful nutritive action and in general improve metabolism, especially Nitrogen metabolism. In addition there is increased Phosphorus assimilation by nerve tissue—hence operating as a direct Phosphorus sparer for the nervous system.

The Glycerophosphates are extensively prescribed for all forms of wasting disease. Whether or not these compounds are really nerve foods, the fact remains that in practice such preparations as the Compound Syrup and Glycerol of Glycerophosphates, the Syrup of Glycerophosphates with Formates, and many of the Milk and Glycerophosphates preparations are credited with tonic properties for use in certain devitalised conditions, *e.g.*, during convalescence from serious illness.

For the Chemical Examination of Glycerophosphates and Tests for Purity see Umney and Bennett, P.J. ii./14,134.

Calcii Glycerophosphas (Neutral), $C_3H_7O_3.PO_3Ca = 210·181$ or $+ H_2O = 228·197$, Fr. Cx., P. Belg. P. Helv. has $+ 2\ H_2O = 246·213$ U.S. IX. requires 98% pure anhydrous salt when dried to constant weight.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**) in water or considerably more *vide infra.*

This salt is formed, together with choline, on the breaking up of lecithin in the process of digestion.

Manufacture.—By reaction of Glycerophosphoric Acid with Milk of Lime, removing Lime in solution with Carbon Dioxide and concentrating (*c.f.* also Patented Methods above). A white crystalline powder, ***soluble*** in cold (1 in 23 by experiment but different makers' products vary), only slightly so in hot water, soluble also in glycerin, insoluble in alcohol.

It may also be made from the Sodium Salt by double decomposition with Calcium Chloride.—Y.B.P. 1913,197.

Uses.—Stated to improve nutrition of the nervous system in all cases where nerve activity is enfeebled; may be given hypodermically, 2 to 4 grains daily in water. **Sterules** contain one grain. It is useful *per os* for incontinence of urine.

Incompatible with soluble Carbonates and Phosphates.

For deficiency of Calcium in the blood. Bold doses required. The soluble Phosphates have power in increasing coagulability of the blood.—L. i./08,97.—B.M.J. ii./09,64.

Severe urticaria cured by Calcium Glycerophosphate—Lime Salts said to be specific.—Hardman, B.M.J. i./11,727.

Neurasthenia. Treatment of.—Glycerophosphates useful in some cases.—J. S. Risien Russell, L. ii./13,1456.

Pulvis Calcii Glycerophosphatis cum Lacte Exsiccato.

Milk and Glycerophosphate.—*Martindale.*

Dose.—One heaped tablespoonful (½ ounce), mixed with 4 to 5 ounces of hot (nearly boiling) water, two or three times daily.

This preparation is intended as a restorative and nutritive. It contains 5 grains of Calcium Glycerophosphate in the above dose combined with *all* the solids of fresh milk.

Our experiments show that a preparation on these lines keeps well and retains a good flavour. Dried Casein alone is sometimes used for preparations of this kind, but in this case eliminates Milk Fat, Salts and Sugar, and Dried Caseins of commerce are not always readily soluble even with added alkali.

Phosphorus and Nitrogen retention are likely to improve under a food of this kind.

Has proved of value in the feeble for inducing sleep.

✱**Vitafer** (T.M. 347470) and ✱**Cibrola** (T.M. 319735, Class 42) are preparations of this description—the former containing the Glycerophosphates of Lime and Sodium.

Calcii Glycerophosphas Solubilis consists of the Neutral Glycerophosphate with Citric Acid added to render it soluble 1 in 25.

Umney and Bennett would prefer this for making Syrups providing it contains at least 15% Ca.—P.J. ii./14,134.

Pilula Glycerophosphatum.

Dose.—One thrice daily after food.

Calcium, Magnesium, Potassium and Sodium Glycerophosphates of each 1 grain.

Mix the Potassium Salt or equivalent of 50 or 75% solution with powdered Liquorice Root ½ grain and place on water bath heated to 130° F. not higher. Remove the heat, stir the mixture occasionally and when it attains the consistence of a pill-mass add it to the other Glycerophosphates previously triturated with Kaolin ½ grain and beat well into a mass. Supply in a bottle. A pill so prepared disintegrates completely in water at 45° F. in half an hour.—C.D. i./11,99.

Ferri Glycerophosphas, $C_3H_7O_3.PO_3Fe+2H_2O=261{\cdot}983$.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.). In whitish powder or in scales containing approx. 15% of Iron—*i.e.*, somewhat less than required by the above formula, slightly soluble in water.

Flavoring.—Syl Lavandulæ, Syl Vanillæ, Syl Limonis.

Vinum Ferri Glycerophosphatis contains 1%, with Glycerin 5% in Sherry. **Sterules** contain ½ grain (0·03 Gm.).

Ⓟ**Compound Iron Glycerophosphate Capsules.**

Dose.—Once thrice daily after meals.

Iron Glycerophosphate, Beta Naphthol of each 3 grains, Extract of Nux Vomica and Indian Hemp of each ¼ grain, Compound Galbanum Pill 1½ grains.

For anæmic patients in dyspepsia.—G. Rankin, B.M.J. i./15,1036.

Lithii Glycerophosphas $C_3H_7O_3.PO_3Li_2$=184·021

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**), and

Magnesii Glycerophosphas. $C_3H_7O_3.PO_3Mg$=194·431.

Dose.—3 to 10 grains (**0·2 to 0·65 Gm.**).

Are white amorphous powders, soluble in water. May be rendered soluble by addition of Citric Acid.—Umney. P.J. ii./14,134.

Manganesii Glycerophosphas. $C_3H_7O_3.PO_3Mn$=225·041.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Is reddish white in colour, only slightly soluble in water.

The relative anæmia which is often associated with cardiac over-strain should be treated by administering Manganese Glycerophosphate with Hæmoglobin. Allbutt's System, 1909, Vol. vi. p. 193, per M.A. 1911, p. 369.

Potassii Glycerophosphas. $C_3H_7O_3.PO_3K_2 + 3H_2O$ = 302·359.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**); hypodermically 3 to 5 grains (**0·2 to 0·3 Gm.**).

A yellowish liquid in 50 and 75% solutions and 100% (solid).

Quininæ Glycerophosphas. *Syn.* KINEURINE.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

$C_3H_7O_3.H_2PO_3.(C_{20}H_{24}N_2O_2)_2.4H_2O$=892·815. FR. CX. has the compound with $5H_2O$, termed 'basic' quinine glycerophosphate in France. A white powder, soluble in alcohol, but only very slightly in water.

Sterules contain ½ grain (0·03 Gm)

Sodii Glycerophosphas.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**), *per os*; also given hypodermically in 3 to 5 grain doses.

U.S IX. requires 68% of Anhydrous Salt. This is equivalent to 85% of the compound + $3H_2O$.

It is supplied commercially in the following forms :—

Dry Pieces or Powder 100% $C_3H_7O_3.PO_3Na_2,3H_2O$=270·159. Very soluble in water. Hygroscopic. **Solution** 75%, a translucent straw-coloured mass which cannot be poured without warming. **Solution** 50%, syrupy fluid convenient for dispensing.

This latter strength is official in the FR. CX. U.S. IX. has under the name LIQUOR SODII GLYCEROPHOSPHATIS a 50% solution of Anhydrous, corresponding to about 74% of Crystalline Salt.

Sterules of Sodium Glycerophosphate contain 3 grains (0·2 Gm.). Also Sodium Glycerophosphate 1½ grains with Strychnine Cacodylate $\frac{1}{64}$ grain and with $\frac{1}{20}$ grain.

Uses.—In nervous affections, facial neuralgia, Addison's disease, lumbago, phosphaturia, anæmia and general debility.

✱ **Glycolactophos** (T.M. 344300, Class 42) is stated to have the formula Sodium and Calcium Glycerophosphate of each 2½%, Casein 95%. In neurasthenia, and where in nerve affections there is phosphatia, in rickets and allied conditions.

Dose —2 teaspoonfuls, twice or thrice daily in milk or water

✱ **Sanaphos.** (T.M. 363457, Class 3, and 363458, Class 42).

Dose.—Two large teaspoonfuls thrice daily in Water, Milk, etc.

An organically phosphated milk product. 80% is rapidly soluble in cold water and amongst the soluble portions, 25% consists of casein itself containing also milk albumen. Associated with this soluble casein is an organic phosphorus compound with a total Phosphorus content 0·7%. Completely and readily miscible with water. In neurasthenia, enfeebled nervous conditions, etc.—L. ii./14,853.

Sanatogen (T.M. 246802, Class 42, and 257583, Class 3), registered 1902 and 1903. Both *removed* from the Register, Oct. 1916, by order of the Board of Trade. The name is public property: ✱ **Genatosan** (T.M. 374966 and 378384) is a new name for Sanatogen. (Genatosan Ltd., applied Jan. 30, 1919 to have the order in question *revoked*, but the application to restore the mark was unsuccessful.)

Sanatogen is made by combining 5% of Sodium Glycerophosphate with Casein. Care is taken to free the Casein from fat, this being accomplished by a suitable solvent.—C.D. Dec. 19/14, Ind. fo. 832.

PATENT 1541/1898 (**expired** 1911). According to this, the casein is mixed with water containing alcohol or other indifferent liquids and rendered soluble by adding the Sodium Glycerophosphate while stirring.

As it contains 95% of Casein one ounce is equivalent to 28·5 Gm. Protein, yielding 117 calories, which is equivalent to the number given by ⅛ of a pint of milk.—J. Am. Med. Ass. 1911, vol. 56, p. 1345. Experiments employing Sanatogen (as a purin-free protein food) on frogs to determine changes in nuclei of blood cells. Also on one of the authors of the paper. The statement is made that Sanatogen stimulates the cells to undergo nuclear division.—L. ii./12,1072

✱ **Sanagen** (T.M. 370293, Class 3, and 364196, Class 42), manufactured in this country a short time after the expiry of the above patent, is similar: Consists of Sodium Glycerophosphate plus the pure Casein of Milk. Analysis showed 75% Proteins and Phosphoric Anhydride equivalent to Sodium Glycerophosphate 12½% (the Sanatogen equivalent being 9·28%). Vitamines were probably removed by the Alcohol and Ether washing, but the Alcohol and Ether washing is not done in the case of Sanagen. Further, it contains no milk sugar or added sugar.—Truth, Nov. 22, 1916. It is a tonic and invigorating nerve restorative.

✱ **Valkasa.** (T.M. 329712, Class 42).—A combination of soluble milk casein with glycerophosphates.

✱ **Visem** (T.M. 334359 Class 3 and 336808 Class 42) is stated to consist of Milk Casein and Whey Powder with 3% each of Ovo-lecithin and Sodium Gycerophosphate. It hence contains lactose and lactalbumen, and is intended as a nerve food.

Tablets are prepared weighing 40 grains approx. and containing 1 grain each of lecithin and the glycerophosphate, in addition to the Milk Compounds.

Dose.—One thrice daily at intervals of 5 hours, increased to 2 or 3 tablets; children one tablet at 11, and 5 daily, increased to 2 tablets at a time.

Strontii Glycerophosphas. $C_3H_7O_3.PO_3Sr=257{\cdot}741$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

White powder only slightly soluble in water.

May be prepared from the Sodium Salt by double decomposition with Strontium Bromide.—Y.B.P., 1913, 197.

P 1 **Strychninæ Glycerophosphas.**

Dose.—$\frac{1}{64}$ to $\frac{1}{20}$ gr. (**0·001 to 0·003 Gm.**).

White crystalline powder, soluble in water. A 'tonic.'

Confectio Glycerophosphatum Composita. *Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Calcium glycerophosphate 2½, Iron glycerophosphate 2, Sodium glycerophosphate 2½, Lecithin ½, Citric Acid 1½, Glyl Anisi 12, Pepsin 1½, Full Cream Dried Milk to 120.

This preparation has restorative, nutritive and digestive properties.

Confectio Glycerophosphatum cum Malto. *Martindale.*
Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Contains the glycerophosphates as in the last mentioned in a basis of Malt Extract. It does not contain Pepsin.

Elixir Glycerophosphatum.
Calcium and Sodium Glycerophosphates of each 2, Iron Glycerophosphate 1, Aromatic Syrup 250. *Dose.*—1 to 4 drachms.

Ⓟ**Glycerinum Glycerophosphatum Compositum.**—*Syn.* GLYCEROLE OF GLYCEROPHOSPHATES. *Dose.*—1 to 2 drachms (**4 to 8 Cc.**).

Cudbear $\frac{1}{4}$ ounce, Water 10 ounces. Boil 10 minutes, strain, and dissolve in the warm liquor—Calcium Glycerophosphate 160 grains, Potassium, Sodium, and Magnesium Glycerophosphates of each 80 grains, Iron Glycerophosphate 40 grains, Citric Acid 30 grains; add Tincture of Kola 10 drachms, Tincture of Ignatia Amara 1 ounce, and Glycerin *q.s.* to 1 pint. This is more palatable than if made with Strychnine and Caffeine. It keeps well, is suitable for export, and for patients who may not take sugar

Glycerinum Glycerophosphatum cum Medulla Rubra. GLYCEROL OF GLYCEROPHOSPHATES WITH RED BONE MARROW.
Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Dissolve Calcium Glycerophosphate 80 grains, Iron Glycerophosphate 20 grains, Magnesium Glycerophosphate 40 grains, Manganese Glycerophosphate 20 grains, Potassium Glycerophosphate 40 grains, Sodium Glycerophosphate 40 grains, and Citric Acid 15 grains in Distilled Water 10 ounces; then filter and add Chloroform 5 minims, Alcohol (90%) 40 minims, Orange-flower Water 1 drachm, Cherry, laurel Water 1$\frac{1}{2}$ drachms, Glycerin Extract of Red Bone Marrow 10 ounces.—P.J. i./06,385. Given in rickets and debility.

The writer prepares this Glycerol with four times the amount of Chloroform, *i.e.*, 1 in 480.

Granular Effervescent Glycerophosphates.
Dose.—60 grains (**4 Gm.**).

Contains in 1 drachm, Glycerophosphate of Calcium 3 grains, of Iron 1 grain, of Magnesium 3 grains, of Potassium 3 grains, with Caffeine Citrate 1 grain. A palatable mode of administration.

Malted Glycerophosphates.
Dose.—1 to 4 drachms (**4 to 15 Cc.**).

Sodium Glycerophosphate 1, Potassium Glycerophosphate 1, dissolved in Water 30, with Liquid Extract of Malt to 120.

A very slight deposit forms. Experiments with a view to including other glycerophosphates, *e.g.*, those of magnesium and calcium did not give preparations which will remain clear.

Ⓟ**Syrupus Glycerophosphatum Compositus,** B.P.C.
Dose.—1 to 2 fluid drachms (**4 to 8 Cc.**). 1 drachm contains 1/80 grain Strychnine with Calcium Glycerophosphate 1$\frac{1}{4}$ grains, Potassium, Sodium and Magnesium Glycerophosphates of each $\frac{5}{8}$ grain, Iron Glycerophosphate and Caffeine each $\frac{5}{16}$ grain—with Glycerophosphoric Acid and Cudbear (*q.v.*, Vol. II.), to colour.

Ⓟ**Capsules** are prepared equivalent to $\frac{1}{2}$ and 1 drachm.

Ⓟ**Pulvis Glycerophosphatum Compositus.**
Dose.—1 to 2 drachms (4 to 8 Gm.).

The following is representative of the Syrup as near as can be made:—Glycerophosphates of Calcium 2·0, Potassium (100%) 1·0, Sodium 1·0, Magnesium 1·0, Iron 0·5, Caffeine 0·5, Strychnine Hydrochloride 0·024 (use Trituration 0·24), Powdered Sugar to 100. This keeps satisfactorily in corked bottles.

Compound Glycerophosphate Tablets are prepared containing in each the same quantities as the Syrup per drachm. To be crushed and taken in a little warm water.

Ⓟ**Syrupus Glycerophosphatum cum Formatibus** (*Martindale*). *Syn.* **Elixir Glycerophosphatum cum Formatibus.** Contains Sodium and Potassium Formates of each 5 grains added to each drachm of a compound Glycerophosphate Syrup (made with Acetic Acid).

Ⓟ**Syrupus Glycerophosphatum** (*Robin*) is a special preparation. *Dose.*—1 to 4 drachms (4 to 15 Cc.).

The original formula by Dr. Robin was given in the *Bulletin General de Therapeutique*, May 30, 1895, as follows:—Glycérophosphate de Chaux 6 Gm., de Soude, de Potasse, de Magnésie aa. 2 Gm., de Fer 1 Gm., Teinture de fêve de St. Ignace 30 gouttes, Pepsin 3 Gm., Maltine (diastase) 1 Gm., Teinture de Kola 10 Gm., Sirop de Cerises (pour compléter) 200 Gm. *The formula is impracticable.*

Emulsio Olei Morrhuæ et Glycerophosphatum.
Dose.—2 to 8 drachms (8 to 30 Cc.).

Contains the Glycerophosphates of Calcium, Iron, Magnesium, Potassium and Sodium, combined with Cod Liver Oil Emulsion, containing 50% Cod Liver Oil. Is a useful nutrient combination.

✱**Jecovol** (T.M. 318395) is a proprietary Emulsion of Cod Liver Oil with Sodium, Calcium and Iron Glycerophosphates.

Sérum Névrosthénique Ampoules contain 0·1 Gm. Sodium Glycerophosphate and 0·0005 Gm. Strychnine Cacodylate. In neurasthenia and other nervous affections.

ACIDUM HYDROBROMICUM.

HBr=80·928.

Acidum Hydrobromicum Concentratum.
Hydrobromic Acid of Sp. Gr. 1·308=35% colourless or straw-coloured, when diluted; one volume with three of distilled water produces an acid of 10% strength. Should be kept from sunlight. If of Sp. Gr. 1·260=30%; 1·375=40%; 1·450=45%.

Incompatible as Acid Hydrochloricum, *q.v.*

Acidum Hydrobromicum Dilutum (*Off.*); U.S., Fr. Cx.
Dose.—15 to 60 minims (1 to 4 Cc.); 60 minims=10 grains of potassium bromide approximately. Contains 10% of hydrogen bromide. Sp. Gr. 1·077. May be prepared by the action of Phosphoric Acid on Potassium Bromide. Sulphuric Acid is unsuitable owing to secondary decomposition. A colourless, very sour liquid, without odour.

Uses.—To allay nervous excitability and exhaustion, as a solvent for quinine and preventing quinism, and as an alternative for potassium bromide is less liable to cause acne; 8 minims will dissolve 5 grains of quinine sulphate in water, given with morphine to allay after effects. Obviates the sense of fulness of the head felt when taking iron for anæmia; also removes effects of excess of tea or alcohol; and to calm excited heart. It is useful for tinnitus aurium and tickling hacking cough at night, in doses of 10 minims or more, and in headache, with flushing in the face and ringing in the ears. In vertigo it is successful and it relieves toothache. In epilepsy, up to ½ ounce well diluted may be given; even to 3 ounces daily.

'Bon Voyage,' a specialty for **sea sickness,** of some service, contains, *inter alia,* this acid and sodium bromide.—B.M.J. ii./09, 1818.

Dose.—Half an ounce in a wineglassful of water every 3 hours for 24 hours before embarking, and for the first two days of the voyage, afterwards in half doses if required.

Bon Voyage Tablets are also prepared, 2 being equivalent to ½ ounce dose.

ACIDUM HYDROCHLORICUM.

"*Poisonous—Not to be taken.*"

For retail in Great Britain and Ireland, the box, bottle, vessel, wrapper, or cover in which the acid is contained must be distinctly labelled with (1) *the* **name of the substance**; (2) *the words* **"Poisonous—not to be taken"**; (3) *the* **name and address** *of the seller. Any liquid substance to which Section* 5 *of the Poisons and Pharmacy Act,* 1908, *—Restrictions on sale of certain Poisonous Substances—applies* (*to wit, Hydrochloric, Nitric and Sulphuric Acids, Soluble Salts of Oxalic Acid, Liquid preparations containing more than* 5% *by weight of free Ammonia, and all liquid preparations sold as Carbolic, etc., containing not more than* 3% *Phenols,—see Poisons Schedule*), *shall not be delivered except in bottles or other containers, rendered* **distinguishable by touch** *from ordinary bottles or containers.*

HCl=36·468 Sp. Gr. 1·160. Contains 31·79% by weight HCl. Ph. Ned and P. Helv. 25%. Fr. Cx. 33·65%. P.G.V. 24·8 to 25·2%.

Antidotes.—Alkalis, sal volatile, saccharated lime, calcium carbonate, alkaline bicarbonates, carron oil, white of egg, morphine, lime water, magnesia, milk, soap and water. Give beef tea enema and stimulants.

Incompatible with alkalis, alkaline carbonates, metallic oxides, silver and lead salts.

Use.—Escharotic.

Alimentary toxæmia.—Bouchard's Remedy: fuming hydrochloric acid 5 to 10 m. freshly mixed at the time of administration with 6 to 8 ounces of water and taken with every meal. Of great value—reinforces the antiseptic power of the gastric juice.—W. Armstrong.—L. i./13, 1384.

Neuritis treated by applying strong Hydrochloric Acid to the skin along the line of the inflamed and painful nerve on a wad of cotton wool. Results striking and appreciated (H. Wingfield's treatment).—H. Sainsbury, L. i./17,911.

The treatment was described 20 years ago. It was discovered accidentally. R. A. Bayliss reported cases successfully treated.—L. ii./17,57.

Acidum Hydrochloricum Dilutum (*Off.*).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Is prepared by diluting 28·44 by vol. of the strong acid with water to 100. Sp. Gr. 1·048. Contains *Off.* U.S., P. Helv. and F. NORSK, 10% HCl by weight. PH. NED. is quadrinormal.

Use.—Tonic biliary stimulant. In dyspepsia, where insufficiency of acid. In pernicious anæmia strong Hydrochloric Acid 10 to 15 drops given in mucilage has been found useful.—M.A. 1911,149. Given before meals with Gentian. Gargle 1 in 50 to 1 in 100 for sore throat. When diluted forms a useful refrigerant drink and lotion.

Hydrochloric acid, free from arsenic, may be made by warming with pure fine copper gauze, and then distilling.—Y.B.P. 1902,36.

In dilatation of the stomach 10 to 15 minims after each meal with or without 6 to 8 grains Pepsin.—Yeo.

Relation of gastric secretion to rheumatoid arthritis, the latter being often associated with some focus of pyogenic infection,—*e.g.*, frequently oral sepsis. In nine cases there was indication of chemical changes in the gastric secretion (*a*) diminution in the amount of free Hydrochloric Acid and also the active Hydrochloric Acid, (*b*) an excess of Mineral Chlorides pointing to a process of neutralisation, and (*c*) a comparatively low ratio between the active HCl and the Mineral Chlorides. An acid mixture containing Dilute Hydrochloric Acid 5 minims, Glycerol of Pepsin 20 minims, Clove Oil 1 minim, Tincture of Quillaia 20 minims, Aniseed Water to ½ oz. *Dose*—thrice daily. Cases benefited.—A. S. Woodwark and R. L MacKenzie Wallis.—L. ii./12,943.

✱ **Oxyntin** (T.M. 274899). *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

An Albumin-Hydrochloric Acid compound. Contains 5% by weight of Hydrochloric Acid (HCl). Ten grains are equivalent to 5 minims of Dilute Hydrochloric Acid instead of which it may be prescribed.

It is readily miscible with water, with slightly acidulous taste, suggested in gastric disorders to increase HCl content.—B.M.J. i./15,807.

ACIDUM HYDROCYANICUM.

Prussic Acid (SCHEELE'S STRENGTH).

$\boxed{\text{P1}}$ *Prussic Acid and all preparations or admixtures containing* 0·1 *or more* % *of Prussic Acid* (i.e., *Hydrogen Cyanide*), e.g., *Aqua Laurocerasi, q.v.*

Applicable to Ireland.—$\boxed{\text{P1}}$ "*Prussic Acid*" *only.*

Ⓟ *All preparations or admixtures containing less than* 0·1% *Prussic Acid* (*Hydrogen Cyanide intended*).

Manufactured by distillation of Potassium Ferrocyanide with dilute Sulphuric Acid.

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

Colourless liquid with powerful odour Sp. Gr. 0·994. Contains 4% HCN=27·023.

Antidotes.—Emetics immediately, stomach tube, brandy, or ether, fresh air, inhaling ammonia, artificial respiration. $\frac{1}{50}$ grain atropine hypodermically. Hydrogen Peroxide and Chlorine Water have been given.

🄿1**Acidum Hydrocyanicum Dilutum** (*Off.*), U.S. Ph. Ned. P. Belg. Fr. Cx. (previously 1% only). *Syn.* Dilute Prussic Acid.

Dose.—2 to 5 minims (**0·1 to 0·3 Cc.**). Fr. Cx.—Max. single dose 1½ minims (**0·1 Gm.**); Max. during 24 hours 8 minims (**0·5 Gm.**).

Contains 2% HCN, Sp. Gr. 0·997. F.I. requires this strength. Keep in inverted stoppered bottles in the dark.

For the estimation of Hydrocyanic Acid and detection of minute amounts in Toxicological work, see Vol. II.

Flavoring.—Glyl Lavandulæ, Glyl Menthæ Piperitæ; Spiritus Menthæ Piperitæ; Syrupus Zingiberis.

Incompatible with soluble silver and iron salts.

Uses.—In dyspepsia with pain, combined with bismuth or sodium bicarbonate. To allay vomiting and cough. It is very useful as a sedative in an effervescing mixture, and as a 2% dilution as lotion to soothe the itching of pruritus ani or pruritus vulvæ, or general prurigo. Must not be used to broken skin surface.

Though largely prescribed for relief of gastric pain, the amount of acid is thought too small to have local effect.—B.M.J. ii./09,540.

To promote healing of acute gastric ulcer bismuth of no particular value, but dilute hydrocyanic acid 5 minims in two drachms water useful for vomiting.—B.M.J. ii./10,504.

Ⓟ**Lotio Acidi Hydrocyanici cum Sodio, L.H.**

Diluted Hydrocyanic Acid 8·3, Borax 9·2, Sodium Bicarbonate 9·2, Water to 1000. As a soothing eye lotion.—**R.O.H.** has 1% of each.

ACIDUM HYPOCHLOROSUM.

$\mathrm{HClO} = 52{\cdot}468.$

Hypochlorous Acid as such has not been isolated. In solution and especially in the form of its salts—the Hypochlorites, *e.g.* those of Calcium and Sodium, it has played an important part in many chemical processes.

The recently popularised method of treating Chloride of Lime with Boric Acid in excess has been recognised in the past as a method of making solutions of Hypochlorous Acid.

The acid in dilute solution is practically colorless; in a concentrated form it is yellowish. It readily undergoes decomposition with formation of chlorine, chloric acid, oxygen and water. It is hence a strong oxidising agent and for this reason a bleaching agent.

Medicinally the Chlorinated Soda Solution was a popular detergent during the last half century, but has latterly fallen into dissuetude. Quite recently, however, the Hypochlorites have been resuscitated and have been very extensively employed for wound treatment in the war as described in the following pages.

Calx Chlorinata. (*Off.*) SEL DE JAVELLE. A dull white powder having about 30% available Chlorine. Solutions of 0·25 to 0·5% applied to burns and ulcers heal them rapidly.

The best commercial samples do not contain more than 70% of Calcium Chloro-hypochlorite ($CaOCl_2$).—J. McCrae, P.J. i./20,273, *i.e.* 39% available Chlorine.

25,000 gallons of water can be sterilised for less than 1d. by aid of Calx Chlorinata.—Thresh, L. ii./08,1597,1846.

Water sterilisation with Calcium Hypochlorite for troops on active service.—Sims Woodhead, B.M.J. ii./14,494. *c.f.* also Vol. II.

Unguentum Calcis Chlorinatæ.

Chilblains can be cured with 10% strength in Paraffin Ointment,

Gonococcal arthritis in women well treated by vaginal douching twice daily with solution of calx chlorinata 1 in 100. Afterwards a solution of Hydrogen Peroxide is freely used.—B.M.J. ii./11,1466

Phthisical sufferers advised to work at bleaching powder factories. Interesting data concerning Chlorine and Nitric Peroxide fumes.—T. Aitchison, B.M.J. ii./15,489.

Liquor Sodæ Chlorinatæ (*Off.*). 2·5% Cl. *Dose.*—10 to 20 minims. Dissolve Sodium Carbonate 600 in Water 1,000. Triturate Chlorinated Lime 400, with Water 3,000. Mix, and filter.

Should be freshly made. Other Pharmacopœias use more Sodium Carbonate to obtain a preparation which will keep better.

The reaction may be represented as follows:—

$$[Ca(ClO)_2 + CaCl_2] + 2Na_2CO_3 = 2NaClO + 2NaCl + 2CaCO_3.$$

The quantity of Sodium Carbonate in *Off.* method is not enough to precipitate all the dissolved Calcium Hydroxide and if sufficiency is used the preparation is excessively alkaline. R. C. Cowley modifies the formula.—C.D. 1919, 91, 49, abst. Y.B.P. 1919, 280.

Uses.—As a wound lotion and for general antiseptic purposes; for infected wounds or ulcers. It is usually employed diluted with 15 to 60 times its volume of water or normal saline. Thus diluted it has been used as a vaginal douche and as an irrigant of the bladder and mouth wash. For use locally in skin affections however, according to the U.S.D. a 10 to 30% dilution is suitable.

It is strongly alkaline and may well be treated with Boric Acid. (*c.f.* Dakin's Solution.)

EAU DE LABARRAQUE OF LIQUEUR DE LABARRAQUE (1822).

As made according to the French Codex, this is about ¼ the strength of Liquor Sodæ Chlorinatæ. (*Off.*). Much confusion has arisen over this Labarraque's Solution from several aspects. The United States Pharmacopœia IX., for example, gives Eau de Labarraque as a synonym for Liquor Sodæ Chlorinatæ—the strong preparation containing 2·5% available Chlorine.

Initially Labarraque made his bleaching solution by passing Chlorine into Sodium Carbonate Solution. In this case free Hypochlorous Acid is present:

$$Na_2CO_3 + 4Cl + H_2O = 2HClO + 2NaCl + CO_2.$$

Eau de Javelle (first made in 1789) was originally a solution of Chlorinated Potash made with Potassium Carbonate on the same lines as Chlorinated Soda Solution, but it is now replaced in great measure by the Soda Compound. For some historical notes on the matter *vide* H. D. Dakin.—B.M.J. ii./15,809.

Liquor Potassii et Sodii Hypochloritum (Becker). Potassium Hydroxide 5, Sodium Hydroxide 4, Water to 1,000. Dissolve and pass Chlorine *q.s.* into the solution to saturate.

Inoperable cancer treated by injections of 1½ to 2 Cc. under the skin daily for varying periods over deltoid muscle, or over the great trochanter, avoiding the growth and neighbouring skin. Platinum needle is used.—B.M.J. i./09,274.

It has been found preferable to make this *half strength.* **Sterules** 3 Cc. of this strength are made.

Liquor Acidi Hypochlorosi Compositus. *Syn.* **Eusol.**—(Lorrain Smith, Drennan, Rettie & Campbell.—B.M.J. ii./15,129).

This solution contains approximately 0·27% Hypochlorous Acid, together with small amounts of Calcium Biborate and Calcium Chloride. It was at first stated to contain 0·54% Hypochlorous Acid, but this was erroneous and was corrected by the authors of the original communication.—B.M.J. i./16,740 ; L. i./16,1058.

The solution is slightly alkaline to test paper.

Manufacture.—Take Bleaching Powder 12·5 (of recent preparation and which has not been allowed to get wet), and Tap Water 1,000. Triturate thoroughly with enough of the water to make a paste and dilute with the remainder. Add Powdered Boric Acid 12·5, and shake thoroughly. Allow to stand for two or three hours and filter through cloth or paper. Or 25 Gm. of Eupad may be used instead of the two ingredients. The interaction according to the originators may be represented by the following :—

$$2CaOCl_2 + 2H_3BO_3 = 2HClO + CaB_2O_4 + CaCl_2 + 2H_2O.$$

It is to be noted that only *half* the ‘ available ’ chlorine (as determined in an assay) is liberated as Hypochlorous Acid, the available Chlorine from $2CaOCl_2$ being 4Cl.

The two powders may conveniently be packed separately ready weighed for use sufficient to make 1 or 2 or 5 litres, for purposes of transit—the chlorinated lime in waxed paper (*c.f.* L. i./16,32).

Preservation.—Keep in stoppered bottles away from the action of light. The preparation maintains its strength for 3 weeks in cold weather. In hot weather it should not be kept more than 1 week.

Loss in Strength.—We have kept bottles of Eusol under observation for four months, titrating them at frequent intervals, and have found the loss in strength to be most marked.

Dakin's Solution, however, keeps much better.

Assay.—Place 25 Gm. of the solution in a flask, add about 1 Gm. of Potassium Iodide and 5 Cc. of Acetic Acid and titrate with N/10 Sodium Thiosulphate solution, using starch paste as indicator. Each Cc. of the Thiosulphate solution employed shows 0·00262 Gm. of HClO (or 0·00354 Gm. available chlorine).

As an alternative process titrate 25 Gm. with addition of a little Sodium Bicarbonate with N/10 As_2O_3 solution (4·95 Gm. per litre), adding this solution from a burette until a drop removed on a stirring rod mixed with a drop of Potassium Iodide-Starch paste on a white tile no longer produces a blue color. Each Cc. of the As_2O_3 solution used shows 0·00262 Gm. HClO. and 1 Cc. of Standard Eusol = 1 Cc. of N/10 Arsenious Oxide.

We found it of importance to liberate the Chlorine first of all in Acid (HCl) solution in doing this titration, *then* add Sodium Bicarbonate and titrate, otherwise the reading will be far too low.

Solutions of this nature may be slightly pink in colour if Manganese is present in the bleaching powder.

Bactericidal Power.—Hypochlorous Acid is a more potent bactericide than its salts. The acid is stated to be the most powerful antiseptic known. It was found to be as active against Anthrax spores as against non-spore-bearing organisms (2 minutes' contact).

Uses.—Although solutions of Alkaline Hypochlorites have been used for many years, solutions of the acid have not been generally employed. Chlorine water probably owes its antiseptic power to the presence of this acid. Lister found the Liquor Chlori of the old B.P. effective when a 1 in 5 solution of Phenol had failed (1870).

Eusol has been most extensively used to wounds. It is the outcome of an investigation at the Royal Infirmary, Edinburgh, to prepare an antiseptic which could be applied as a first dressing in the field to prevent sepsis. It has no harmful effect upon the tissues, the effect being purely local. Flow of lymph is induced by it from the tissues. Its most marked property is the removal of offensive odor in the wound. For field use the practical advantages are that the antiseptic may be used as such or in the form of dry powder (Eupad) if water is not available—*vide* Eupad.

The authors of the original communication state that the solution was used in the customary out-patient cases—injuries to the head or hands, lacerated, contused or incised, many being septic. It was used as a lotion, a 'soak' covered with waterproof or as a dry dressing (gauze wrung out of the solution and then applied with the usual wool or bandage covering). Septic cases were clean in 1 to 3 days, while Boric Acid soaks conducted as control required 4 to 6 days.

In clean injuries it had about the same effect as Iodine, but produced less smarting.

In mastoid operations and in cases of cerebellar abscesses the use of the solution was most encouraging, also as a douche in maternity cases and in cystitis, for treatment of ulcers of the leg, gangrene of the feet, pyorrhœa alveolaris and follicular tonsillitis. There is no danger of absorption. There was no indication of deleterious effect even on devitalised tissue. In a wound superficial bleaching may occur and with some irritation. If pain is produced, it is a sign that the application is too strong, and it is to be diluted with normal saline. All the above notes refer to the undiluted preparation.

The solution combines a hypertonising effect with its antiseptic action. Whether salt may be added to increase its hypertonicity to improve its effect is a matter for further investigation. It has to be frequently renewed.

In general, Eusol may be employed as (*a*) a lotion; (*b*) a fomentation with waterproof cover; (*c*) on gauze wrung out and applied without waterproof; or (*d*) as a bath full strength or diluted. The object is to secure the maximum effect with minimum irritation. As a lotion it should in preference be used *warm*, for example by standing the bottle in a basin of hot water.

The solution is, of course, inexpensive as to its ingredients, the principal cost being the time and skill required.

Tested by the **Edmunds' Cell** method, Sir W. Watson Cheyne found that Eusol did not effect any marked inhibitory action by diffusion. Eupad, however, diffuses widely in agar plates. It is possible it would be a useful agent in delaying infection in the first instance.—L. ii./15,672.

Recent wounds before suppuration has occurred specially well treated. It has greatly displaced all other forms of treatment in many of the Casualty Clearing Stations. It has prevented the occurrence of gangrene in many bad lacerated wounds, and has arrested its progress in others. It should only be used in solution, for if used as powder it is liable to form hard lumps which obstruct free drainage and so counteract its good effects.—Sir A. Bowlby, L. ii./15,1397.

A good deodorant, its activity is sometimes magical. Eusol is seldom painful, and a good routine application, but some skins are very susceptible to it. *It must not be applied for long periods to wounds of the back of the hand, dorsum of foot and of the neck, forearm and wrist.* In general it should be applied once or exceptionally twice daily and *should not be covered by protective.* It should be freshly made. The drip method is specially useful in compound fractures, and in all lacerated wounds of the limbs where there is gas gangrene and foul smelling sores. One of the best dressings tried. It need not be continued after the wound is fairly clean and free from smell. A sterile dressing is then sufficient.—A. Don, B.M.J. i./16,648.

Varicose ulcer, carcinoma of rectum (operation), lacerated wounds (results of accidents), severe burns, cystitis (1 in 8 irrigation), tuberculous periostitis with abscess and ulceration, tuberculous arthritis of knee (sinus), hydatid cyst (douche with 2 pints half strength), septic cellulitis, tuberculous osteomyelitis, necrosis of lower jaw for 6 months, tuberculous hip joint (amputation through joint), acute suppurative appendicitis (syringe and soak half strength), acute streptococcic infection of thumb, epithelioma of neck, tuberculous empyema, gonorrhœal discharge (burning pain at first on injection—1 in 5—but decreased as discharge lessened and finally stopped in 5 days), tuberculous otitis media, tonsillectomy (sprayed)—are amongst the 99 civil cases reported by the Medical Research Committee in which Eusol and Eupad were successfully used.

Bullet and shell wounds, compound fractures, the wounds being all septic on reaching the hospitals comprise the 58 military cases in which there was in general "rapid healing."—L. i./16,300,356.

Intravenous Use of Eusol.

Professor Lorrain Smith and those associated with him determined that Eusol undiluted could be injected intravenously into rabbits in amounts up to 25 Cc. without any ill effect. As much as 45 Cc. in one case were given, *i.e.* an amount equal to $\frac{1}{4}$ or $\frac{1}{2}$ the total blood volume.

The injection of amounts of 50 to 100 Cc. has been practised in man in grave toxæmic conditions.

Puerperal septicæmia treated with 100 Cc. repeated after 24 hours without untoward effect. The Hypochlorous Acid probably destroys toxin circulating in the blood. There was no evidence that the Eusol acted as a bactericide.—Lorrain Smith, Ritchie & Rettie.—B.M.J. ii./15,716.

Malignant endocarditis with pneumonia treated by 80 to 120 Cc., without harm—*ibid.* Malaria treated—L. i./20,1095.

Liquor Calcis Chlorinatæ (a 10% solution) may also be used to make Eusol. Dilute 135 Cc. of the B.P. Liquor to 1 litre, add Boric Acid 10 Gm., and shake to dissolve. The Boric Acid may be kept in saturated solution (4%). 250 Cc. will be required to make the litre of Eusol. Dilute the Liquor Calcis Chlorinatæ to 750 Cc. and add the 250 Cc. Boric Acid solution. Liquor Calcis Chlorinatæ keeps well. These quantities are based on a chlorinated lime assaying 25% available chlorine, which is about an average If Bleaching Powder of high quality is used, 125 Cc. of the solution will be sufficient.

For Intravenous Injection in septicæmia, dilute the 135 Cc. of Chlorinated Lime Solution to 500 Cc., add the Boric Acid Solution, and finally Sodium Chloride 8·5 Gm. in Water 250 Cc.—Prof. Lorrain Smith and co-workers, B.M.J. ii./17,386.

Acute toxæmia secondary to gas gangrene treated by Hypochlorous Acid solution (Eusol to which 0·85% Sodium Chloride was added) intravenously. 40 Cc to 70 Cc. doses by means of a Record syringe into the median basilic vein. In one case 70 Cc. Recoveries in three cases very gratifying.—J. Fraser and H. J. Bates, B.M.J. i./16,83.

Further cases with excellent recoveries. 25 to 70 Cc. doses. The effects of toxins produced by gas gangrene organisms can be neutralised by hypochlorous acid in this manner.—J. Fraser and H. J. Bates, B.M.J. ii./16,173.

Its feeble alkalinity (due to calcium biborate) renders it safe for introducing into wounds and serous cavities In lacerated and contused wounds it is the most efficient antiseptic we possess. A solution of pure hypochlorous acid (*i.e.*, without the calcium biborate) cannot be injected intravenously as it coagulates the blood, nor can a dilute Sodium Hypochlorite solution, as it causes hæmolysis. The rate of injection (10 Cc. per minute) is an important point.—B.M.J. i /16,171,175.

A two-way canula fitted with a stopcock is useful—attached to the 20 Cc. Record syringe. Saline from the syringe is first injected, then the Eusol (warmed to body temperature) is drawn up from a flask. As much as 150 Cc. may be given. Care must be taken not to inject Eusol into the tissues, as even a few drops causes severe pain.—J. A. Graham, B.M.J. i./16,632.

H. D. Dakin states that as a dose of 100 Cc. (containing 0·27 Gm. $HClO$) on injection becomes at once diluted with 4 or 5 litres of blood, assuming no decomposition occurs, the resulting strength is not more than 50 to 65 mgr. $HClO$ per litre, and even if this concentration persisted, it is much below the strength at which direct action is observed, for example on *B. Coli* or *Staphylococci* suspended in blood or even in serum. Direct germicidal effects cannot be ascribed in these circumstances. For interesting theoretical points as to the action of Hypochlorites on Blood Serum, the original must be consulted.—B.M.J. i./16,852.

The action, it is thought, depends on formation of Chloramines *q.v.* *Vide* also Cordova's work *infra.*

Septic endocarditis treated by injection of 40 Cc. preceded by 300 Cc. of Normal Saline. The case was a girl of 13—apparently moribund at the time of injection. Recovery.—J. Allman Powell, B.M.J. ii./26,422.

Generalised sepsis. Two cases of septic otitic thrombosis of the signoid sinus. 60 Cc. intravenously with the same quantity of lukewarm saline. Successful.—J. S. Fraser and A. Campbell, B.M.J. i./27,357.

Modifications of Eusol.

Cordova's Modified Eusol. To normal Saline 800 Cc. add Chlorinated Lime and Boric Acid of each 10 Gm. Shake and allow to stand for two to three hours, filter and add Calcium Chloride 2 Gm. This solution must not be kept longer than three days.

Intravenously 20 Cc. doses in a rabbit were generally well tolerated. 10 Cc. entirely harmless. 10 Cc. doses of the solution protected the animal against diphtheria toxin and against *repeated doses* of Tetanus and against *Staphylococcus Aureus* and *Bacillus Perfringens.* This destruction of toxins is probably of the nature of a protein coagulation.—R. F. Cordova, B.M.J. ii./15,504; i./16,651.

It was suggested (L i./16,32) that a mixture of Sodium Bicarbonate and Chlorinated Lime might be substituted—the carbon dioxide of the bicarbonate to liberate the HClO, but a mixture of this kind could not be used intravenously, as it coagulates the blood—which Eusol does not. Chemically Boric Acid acts to some extent as a stabiliser, while a Chlorinated Lime and Sodium Bicarbonate mixture after 7 days at 40° has lost almost its entire original "available" chlorine.—R. Glode Guyer, L. i./16,253,265.

Electrically made Hypochlorous solution as a disinfectant. Does not coagulate albuminous matter. It is non-irritating. Found better than ordinary Hypochlorite Solutions. Requires special apparatus which can be made at comparatively small cost. Successful in throat work, scarlet fever and eczema.—F. C. Lewis and G. W. Gee, B.M.J. i./17,256.

(Chas. Watt discovered an electrolytic process in 1859, since when there have been "scores" of electrolytic processes advanced.—B.M.J. ii./15,809.)

Eupad. **Pulvis Calcis Chlorinatæ et Acidi Borici.**

(Lorrain Smith and co-workers, B.M.J. ii./15,129.)

Mix intimately equal weights of finely ground Bleaching Powder (dry) and powdered Boric Acid.

Preservation.—Should be kept in closely stoppered bottles and not exposed to the light more than necessary—indeed, it would be preferable to mix it quite freshly for use, as there is much loss of Hypochlorous Acid on keeping owing to the inherent moisture always present in Chlorinated Lime.

A word of warning may be added as to mixing considerable quantities of Chlorinated Lime and Boric Acid. The marked evolution of Chlorinated vapour is quite sufficient to "gas" the unwary.

Strength.—Employing Bleaching Powder of the *Off.* strength, this preparation contains 15% available Chlorine or 11% approx. of Hypochlorous Acid.

Uses.—This antiseptic dressing was advocated simultaneously with Eusol described above. It evolves Hypochlorous Acid and can be used as a dry dressing.

The gas evolved acts more energetically than that contained in Eusol, and it is liberated more rapidly when moistened between layers of gauze or lint (as in the pad of the first field dressing), and covered with wool and a bandage.

When applied as above but covered with waterproof it should be used for a short time only—10 to 15 minutes as a rule. If it causes pain a weaker application is indicated. The irritation, however, usually affects the skin surrounding a wound.

It can also be used on strands of gauze or wool by a process of drainage or as a dusting powder—for example on septic sores.

A large boil on the leg—amongst cases cited—was opened and a drain of gauze powdered with Eupad inserted. On the second day the wound was dry and no pus could be expressed. The drain was repeated for another day and afterwards dry sterile gauze. Completely healed by the ninth day.

1 to 2 Gm. is the quantity mentioned as suitable for use in the first field dressing.

Pulvis Calcis Chlorinatæ et Acidi Borici Mitis. *Syn.* "**Kepad.**" —*Martindale.*

Manufacture.—Chlorinated Lime 1, Boric Acid in fine powder 9½, Kieselguhr (sterilised thoroughly) 9½ (*i.e.*, 5% Chlorinated Lime).

In their communication on EUPAD and EUSOL, Professor Lorrain Smith and his co-workers (B.M.J. ii./15,129) admit that Eupad may cause irritation, and it is stated that if pain is caused a weaker application is indicated.

Major A. Don (B.M.J. i./16,648) also draws attention to the pain caused by its employment in the field (whilst Eusol he says is seldom painful).

In view of the fact that Eusol is only in the neighbourhood of 0·26% Hypochlorous Acid strength, this milder Eupad, (1/10 the strength) suggested itself both for use in gauze dressings and as a dusting powder on septic sores.

Preservation.—The Powder resembles Eupad in keeping properties, and should be kept in stoppered bottles. It may retain its strength better in proportion than the original mixture. Where considerably used it is convenient to keep the sterile Kieselguhr and Boric Acid ready mixed and to add the Chlorinated Lime when required. Kepad containing stronger proportions of Chlorinated Lime may be prescribed, *e.g.* 10, 20, 30%, etc.

In similar manner smaller proportions—1, 2%, etc.—of Chlorinated Lime may be ordered—the ratio of Boric Acid and Kieselguhr being kept always the same, *viz.*, equal amounts.

In this way it will be possible to determine limit of toleration and gain the maximum antiseptic power. Kieselguhr commends itself particularly as diluent on account of its light physical character and absorbent properties.—B.M.J. ii./16,147.

Dakin's (Stronger) Hypochlorite Solution.

The following method we find best in making large quantities :—Rub Chlorinated Lime 150, into a smooth paste with 100 of water and add gradually with stirring Sodium Carbonate (Cryst. + $10H_2O$) 285, previously dissolved in water 900.

Allow to deposit, filter and titrate 20 Cc. of the filtrate with Boric Acid solution (31 Gm. per litre) using phenolphthalein suspended in water as indicator to ascertain the amount of boric acid to be added to the bulk. An excess is to be avoided ; it is best to add slightly *less* than the calculated amount. Alcoholic solution of phenolphthalein cannot be used as the alcohol is at once attacked.

Strength.—This concentrated solution contains about 4 per cent. of sodium hypochlorite and is ***to be diluted with 6*** *parts of water for use.* It can be kept for a month without serious decomposition.

As to the amount of Boric Acid to be added—the titration must be done fairly rapidly—our experience agrees with that of H. Rodwell, P.J. ii./15, 750, 805, that the quantity does not vary greatly with each batch. The amount requisite to be added is approximately 2% of the volume.

The principle of use of the preparation depends on the fact that certain fluids, such as blood and certain artificial salt solutions containing a mixture of salts of polybasic acids—*e.g.*, phosphoric acid—retain their essential neutrality even after the addition of limited quantities of acid and alkali, which merely changes the relative proportion of two or more salts of the polybasic acid in the solution. The use of the feebly polybasic boric acid makes a solution containing a balanced mixture of hypochlorite and polyborates of sodium with small amounts of free hypochlorous and boric acids. The irritating action of free alkali is thus avoided. The boric acid is not used for its slight antiseptic action, nor is it used to liberate hypochlorous acid. The solution maintains approximate neutrality under all conditions.

F. Goldby's note on the preparation.—P.J. ii./15,573,775.

Dakin's (Weaker) Hypochlorite Solution.

Rub Chlorinated Lime (of good quality) 200 Gm. to a smooth paste with a little water and dilute with water *q.s.* to 5 litres. Dissolve Sodium Carbonate (Cryst. + $10H_2O$) 400 Gm. in a further quantity of 5 litres of water and add to the Chlorinated Lime suspension with thorough stirring or shaking.

After ½ hour the clear liquid is syphoned off and filtered through cotton wool. Boric Acid 40 Gm. is added to the clear filtrate (not before filtering). The solution should not be kept longer than 1 week.

It is of interest to compare the approximate strengths of the ingredients of this preparation with Liquor Sodæ Chlorinatæ (*Off.* in making 1 litre.

Off.	Dakin's stronger solution divided by 7.	Dakin's weaker solution	Theoretical quantities (approx.).
Chlorinated Lime, 100 (30% available Cl.).	21 approx.	20	100
Sodium Carbonate Cryst., 150 ($10H_2O$).	41 approx.	40	121

Taking into consideration the equation :

$$[Ca(ClO)_2 + CaCl_2 + 2H_2O] + 2Na_2CO_3,10H_2O = 2NaClO + 2CaCO_3 + 2NaCl + 22H_2O.$$

100 of Chlorinated Lime require 197·2 of Sodium Carbonate.

But this formula for Chlorinated Lime is theoretical only. (There are several other theoretical formulæ.—*c.f.* J. McCrae, P.J. i/20,273.) A compound of the formula $[Ca(ClO)_2 + CaCl_2 + 2H_2O]$ contains 48·9% available chlorine, whilst the *Off.* article contains 30%.

Therefore 100 parts of a Chlorinated Lime of this strength would interact with $\frac{197{\cdot}2 \times 30}{48{\cdot}9} = 121$ of Sodium Carbonate.

It will be seen that Dakin's (weaker) solution and his stronger solution on dilution are approximately 1/5 the strength of Liquor Sodæ Chlorinatæ, and that there is a considerable excess of sodium carbonate employed. This is neutralised with Boric Acid as explained above.

Strength.—Some confusion arises in the expression of the strength of preparations of this kind. This weaker preparation contains 0·5 to 0·6% of Sodium Hypochlorite, which is equivalent to 0·48 to 0·57% available chlorine or 0·35 to 0·42% Hypochlorous Acid.

The stronger Dakin Solution is approximately 7 times these strengths.

Bactericidal Power.—The antiseptic power of Sodium Hypochlorite using *Staphylococcus Aureus with 2 hours' contact* (!) in water, it is stated, lies between 1 : 500,000 and 1 : 1,000,000, while in the presence of Blood Serum the necessary concentration is between 1 : 1,500 and 1 : 2,000.

By "Hypochlorite" is clearly meant the 0·5% $NaClO$ contained—in other words, to kill the organism in water in 2 hours between a 1 in 2,500 and a 1 in 5,000 *dilution* of the solution is requisite, whilst in the presence of serum between a 1 in 7·5 and a 1 in 10 dilution is necessary. The solution is hence not extraordinarily powerful.

It appears to us that the 2 hours contact is an extraordinary long time to permit the antiseptic to act for purpose of comparison with other potent antiseptics, and may give rather a distorted interpretation.

It is stated that Iodine between 1 : 100,000 and 1 : 1,000,000 killed Staphylococci in water in 2 hours—the idea being to prove "Hypochlorite" more active—but we found in experimenting in 1914 that 1 : 50,000 Iodine would kill the generally used Test Organism *B. Coli in 2½ minutes*, and considering that 1 : 75,000 of chlorine we found (1914) also kills this organism in 2½ minutes, we fail to see the object in using the 2 hours time limit. Perhaps at 2½ *minutes* Iodine and many other antiseptics *in the presence of serum* would beat the Hypochlorite easily—we note that Iodine and Hypochlorite are practically on a par in blood serum with 2 hours contact. But, as is truly stated by the author, other factors than germicidal action need to be considered for therapeutic use.

Uses.—As a non-irritating antiseptic for treatment of wounds. The treatment should be started early and fresh quantities of the solution should be brought in contact with all parts of the wound as frequently as possible for a considerable period of time. The solution assists in the rapid dissolution of necrosed tissue, this being doubtless due to the ability of hypochlorites to attack the NH groups present in proteins forming soluble chloramines. Compounds of the Chloramine type are formed *in situ* when wounds are treated with hypochlorous acid, and this is an advantage, as a certain antiseptic action may be expected to persist even after the free hypochlorite has disappeared—*c.f.* Chloramine-'T.'

Dakin points out (B.M.J. ii./15,809) that ordinary Liquor Sodæ Chlorinatæ owing to hydrolysis gives rise to alkalinity, which increases with dilution :

$$NaClO + H_2O = NaOH + HClO$$

hence the Boric Acid was added with a view to neutralising the caustic action of such solutions. The caustic alkali as formed is neutralised by the Boric Acid or acid borates present.

The solution was first advocated for use by *Carrel's Method* (B.M.J. ii./15,318)—introduction into wounds by rubber tubes.

The rubber tubes are closed at the end and in the sides there are numerous small openings about a centimetre apart. Pieces of gauze are placed lightly round and between the tubes and the solution runs into the wound and irrigates it.

When applied for continued irrigation vaseline may be smeared on the adjacent skin to prevent irritation. Cicatrisation is not delayed even by continuous use.

N.B.—Not to be injected intravenously.

The best results in the first six months trial at the front were in ambulance cases where the treatment could be begun early.

Results uniformly good on the wounded (57 cases) treated on board the *Rewa*. Used as a routine lotion. One or several rubber tubes used for introducing the hypochlorite. These are inserted and slips of gauze arranged round the tubes and lightly packed into every part of the wound—the gauze slips act as wicks to pass in fresh quantities of Hypochlorite. In badly septic cases the hypochlorite may be injected into the tubes (Carrel's method) every 2 or 3 hours for 24 or 48 hours.—F. J. A. Dalton, B.M.J. i./16,126.

Sloughing and dead and decomposed material quickly disappear. There must be no impermeable material outside the gauze. Carrel-Dakin method well spoken of, but there is much need for care in locating the tubes, regulating the instillation, and in some cases ensuring that the patient's bed and clothing do not become soaked. —Sir G. H. Makin's Hunterian Oration, B.M.J. i./17,216 ; L. i./17, 252.

Free access of the antiseptic constantly renewed and free escape of discharges essential in war wounds.—Sir B. Moynihan, B.M.J. i./16,336.

For a general résumé of the earlier work on the subject see B.M.J. ii./15,262.

Carrel-Dakin Treatment of wounds. Report of description of the method from a Committee to the D.G.M.S.—B.M.J. ii./17,597. See also i./18,170.

Empyema treated by douching and syringing with Dakin's Solution—not dangerous provided there is a free exit for the fluid.—R. A. Stoney, B.M.J. i./18,198.

Daufresne's Modified Dakin's Solution.

Chlorinated Lime 200 Gm. is shaken vigorously with 5 litres of water and left in contact for 6 to 12 hours. Sodium Carbonate (Dry) 100 Gm. and Sodium Bicarbonate 80 Gm. are dissolved in a further 5 litres. This solution is poured into the Chlorinated Lime Solution, the mixture well shaken and filtered.

The solution should contain between 0·45% and 0·5% Sodium Hypochlorite. Its use is particularly satisfactory if employed in the first 24 hours after the infliction of the wound. 75% of the deaths from wounds in war, it was stated, after the first 24 hours, were due to sepsis.—Sherman on Carrel's Sterilisation method.—L. ii./16,800.

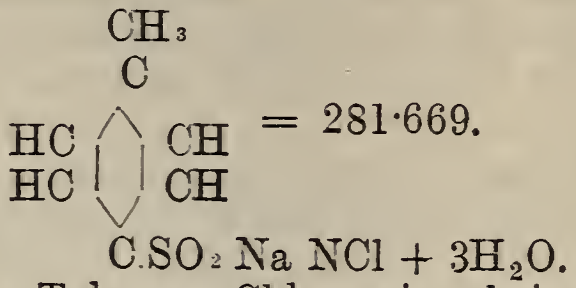
Magnesium Hypochlorite is well tolerated by the tissues. Less caustic than the sodium compound. It has less antiseptic power, but twice as much can be used.

To prepare, mix Magnesium Sulphate 190 Gm. in 2 litres of water and interact with Chlorinated Lime 100 Gm. dissolved in the same amount of water and filter out the Calcium Sulphate.—B.M.J.E. i./16,16.

✱ **" Milton " Disinfectant** (T.M. 375959, Class 2, 381,513, Class 2 as octd. and 382491, Class 3, assoctd.). This antiseptic contains a stable Hypochlorite with a high percentage of hypochlorous acid. A deodoriser, preservative, insecticide and general antiseptic. It is stated to be harmless to the human system either internally or externally.

Chloramine-'T.'

Syn. CHLORAZENE, or *p.*-TOLUENE SODIUM SULPHO-CHLORAMIDE.



= 281·669.

('T' indicates relationship to Toluene, Chloramine being the name given to some Pastilles.)

The substance is also issued under the name ✱Tolamine (T.M. 371601). Care should be taken to prevent confusion with *Chloramide*—an unnecessary to our mind—contraction for Chloralamide.—L. i./16,838.

Historical.—Originally made and studied by Chattaway.—Trans. Chem. Soc. 87, p. 153 (1905).

Manufacture.—*p*-Toluene Sulphonamide is made by acting on *p*-Toluene Sulphone Chloride (a by-product in making Saccharin) with Ammonium Carbonate.

Chattaway treated the amide with bleaching powder and acetic acid and converted it into *p*-Toluene sulpho-dichloramide and this by the action of Sodium Hydroxide was converted into *p*-Toluene-Sodium-sulphochloramide.

Dakin (B.M.J. i./16,161) advises as more economical to dissolve the sulphonamide (1 mol.) in 5% cold alkaline solution of Sodium Hypochlorite (1·2 mol.), warm gently if necessary, filter and add 1½ volumes of saturated brine. Chloramine-'T' crystallises out, is filtered off, washed with brine and dried in the air.

The theory appertaining to the use of this substance as an antiseptic is that Hypochlorous Acid acting on protein and allied bodies containing the =NH group effects a substitution of the H atom by Cl with formation of Chloramines.

$$\begin{matrix} R_1 \\ R_2 \end{matrix}\!>\!NH + HClO = \begin{matrix} R_1 \\ R_2 \end{matrix}\!>\!NCl + H_2O$$

These Chloramines in themselves are all potent antiseptics and bodies of this type are formed in wounds when treated with Hypochlorite antiseptics. A *soluble* Chloramine compound was looked for which led to the selection of *p*-Toluene-Sodium-Sulphonechloramide and the Benzene analogue both of which can be used in higher concentration than the Hypochlorites. The simplest Chloramine NH_2Cl is probably formed during treatment of sewage by Hypochlorite.—H. D. Dakin, B.M.J. ii./15,318,810.

Bactericidal Power.—Chloramine-'T' 1 : 1,000,000 in water with 2 hours' contact kills staphylococci and in the presence of serum the strength for this and the Benzene analogue required is between 1 : 1500 and 1 : 2500. The Benzene analogue is only half as active in water as the 'T' body—1 in 500,000 being required. In concentration below 1 in 10,000,000 the Toluene body kills *B. Perfringens* in water in 2 hours.—B.M.J. ii./15,262.

Molecule for molecule it is thought to be 4 times as active as Sodium Hypochlorite. Almost all the aromatic bodies containing the NCl group are active bactericides. More than one NCl group in the molecule does not increase power.—B.M.J. i./16,388.

Germicidal power of chlorine antiseptics (Chloramine-'T,' etc.) as compared with Acriflavine, etc. The former are far more potent (in the presence of serum). The technique employed by Browning gave misleading data.—H. Dakin and G. K. Dunham, B.M.J. ii./17,641.

Solubility.—A saturated solution contains about 1 in 7 at room temperature. It is soluble 1 in 2 of boiling water, 1 in 7 of glycerin, 1 in 12 of alcohol—by our experiments, but caution should be exercised with solutions in organic solvents—for example we found that on keeping, the Glycerin solution crystallised, gelatinised to some extent, and there was a certain amount of gas evolution. The aqueous solution is faintly alkaline and has a bitter taste. It is insoluble in Liquid Paraffin.

Incompatible.—Alcohol and Hydrogen Peroxide and many other substances. Should not be mixed with other antiseptics.

Uses.—For treatment of infected wounds and as a general surgical antiseptic, mouthwash, vaginal douche and for urethral irrigation. It is non-irritant and practically non-toxic; does not coagulate blood serum. Not suitable for intravenous use—has marked hæmolytic action.

Strength for Use—2 to 4%. The former is used for injecting into infected wounds and for general use—increased if required. Mouth-wash, nasal or vaginal douche or for urethral irrigation, 0·25 to 2%.

To *sterilise water* 1 in 250,000 of Chloramine-'T' is effective if a little Citric Acid (0·8 Gm. per litre) be added—the resulting water is not unpleasant to taste.—B.M.J. i./17,682. *c.f.* Halazone.

CHLORAMINE-'T' PREPARATIONS.

Tablets 8·75 grains. Two in 2 ounces of water = 2%. Tablets 43·75 grains. One in ten ounces water = 1%. Two tablets = 2%.

Chloramine-'T' Gauze, 5 and 35% strength is made.—The former for general use; the latter as preliminary dressing of a wound.

Use *dry* and subsequently moisten if necessary when in position. Even 4% gauze, experience shows, has higher antiseptic value than any other gauze on the market.—Medical Research Committee, B.M.J. ii./16,766. For *some further aspects,* see B.M.J. i./16,454,455.

Highly spoken of for checking development of infective processes. Will effect a growth of new, healthy granulation tissue in a remarkable way.—Sir B. Moynihan.—B.M.J. i./16,335.

Chloramine-(T) Oily Suspension.

Experimental.—During the war (November, 1917) we had occasion to make experiments to produce a solution of Chloramine-'T' in Liquid Paraffin. It is practically impossible. We tried all the likely substances which could be used as an intermediary without success.

A more likely project seemed to be the use of *p*-**Toluenesulphochloramide** that is to say, the "*acid*" of which Chloramine-'T' is the Sodium Salt. This substance is readily soluble in organic solvents, *e.g.*, in Chloroform, but the compound throws out again when a chloroformic solution is mixed with the paraffin.

The acid body is also readily soluble in *Aniline Oil*, but this solvent is also of little value as an intermediary; it is soon oxidised and the mixture with paraffin separates and becomes brown.

It is also slightly soluble in *Olive Oil*, which latter mixes with Paraffin in all proportions, but when employed as an intermediary the result is likewise disappointing. We may add as a matter of experimental interest that the *acid body* referred to is readily made from ordinary commercial Chloramine - 'T,' by adding Hydrochloric Acid to a saturated aqueous solution of Chloramine - 'T,' *q.s.* to render acid to litmus, stirring the solution the while with a glass rod. The body throws out in nice crystals, which can be collected and washed in the usual way.

We concluded therefore that a **Suspension** of one or more per cent. of ordinary Chloramine - 'T' in very fine powder in Liquid Paraffin, or preferably in a mixture of Liquid Paraffin and White Soft Paraffin, would be useful therapeutically. This should be quite efficacious spread in a thin layer on wounds.

Chloramine-'T' Ointment—Chloramine-'T' 10, Sodium Stearate 86, Water 4. As a dressing to a wound after it has become superficial and is healthily granulating. The content may be increased to 12% or reduced to 6%.—B.M.J. ii./17,597. A 1% *Cream* is usually employed.

References.

Mouth and jaw wounds treated with 2% solution. Non-irritant. Results in seven cases good.—A. R. Fisher, B.M.J. i./16,87.

Value of Chloramine - 'T' and the hypochlorites appears to rest to a great extent on their action as solvents of necrotic tissue and power of destroying toxic substances since their bactericidal power in presence of serum is comparatively weak (*c.f.* Flavine) and at the same time they greatly interfere with phagocytosis.—C. H. Browning and Colleagues, B.M.J. i./17,76.

Meningococcus carriers treated with Chloramine - 'T' and Acriflavine and other antiseptics. None of the methods had conspicuous merit or advantage—one-third of the cases recovered spontaneously, —P. Fildes and P. B. Wallis, L. ii./17,527.

Di-Chloramine - 'T.' *Syn.* **Toluene-Sulphodichloramide.**
$CH_3C_6H_4.SO_2.NCl_2 = 239{\cdot}081$.

This substance enables an oily solution to be prepared, the corresponding monochloride being insoluble in oils. (*c.f.* our experiments *antea.*)

Manufacture.—Chattaway (Jl. C.S.T. 1905, Vol. lxxxvii. p. 145) prepared this compound on the following lines :—

Shake thoroughly Chlorinated Lime 350 to 400 Gm. in water 2 litres for one hour and allow to deposit. Syphon off the clear liquor and filter off the remainder. Add Toluene-*p*-sulphonamide 75 Gm. to the liquor and shake to dissolve. Filter if necessary. Acidify in a separator with Acetic Acid 100 Cc. added in portions and extract the Dichloramine with Chloroform about 100 Cc.

Dry the Chloroform layer after removal with Calcium Chloride and allow to evaporate in the air. Recrystallise if necessary.

Alternative Method.—Pass Chlorine in sufficient quantity to saturate into a mixture (which is kept cool) of Toluene-*p*-sulphonamide 50 Gm., Water 500 Cc., Sodium Acetate (cryst.) 100 Gm., and Chloroform 100 Cc.—more chloroform being added if necessary to dissolve. Remove the Chloroform layer and proceed as above.

Chlorinated Eucalyptol.

Treat Eucalyptol 100 Cc. with Potassium Chlorate 3 Gm. and Hydrochloric Acid (conc.) 10 Cc. for 12 hours or longer. Then wash with water and with Sodium Carbonate solution. Remove the water, add Sodium Carbonate 3 Gm., and allow to stand 24 hours. Filter and dry with a little Calcium Chloride.

Chlorinated Paraffin.

Employ Liquid Paraffin 100 Cc. with Potassium Chlorate and Hydrochloric Acid as above, exposing the mixture to the light, preferably sunlight, several hours. Wash with water, then Sodium Carbonate, then water again. Remove the oil, add a little Calcium Chloride and about 1 Gm. of Animal Charcoal. Shake and filter.

Solution of Dichloramine-'T' in Chlorinated Eucalyptol-Paraffin.

Dissolve Dichloramine-'T' 2, in Chlorinated Eucalyptol 20 without heating, and add Chlorinated Paraffin 80.

The solution is relatively unstable and not to be used when a distinct precipitate appears.—E. K. Dunham and H. D. Dakin, Med. Res. Com., B.M.J. i./17,265,865.

Russian Oils, containing much Naphthenes, are not so suitable as American (Pennsylvanian) Oils, which contain considerable quantities of Olefines as well as Naphthenes.—Dakin and Dunham, B.M.J. i./18,51. *c.f.* p. 625.

Uses.—This oily solution has been suggested for disinfection of the naso-pharynx in the treatment of meningococcus carriers and the carriers of other disease organisms.

Dichloramine-'T' in Eucalyptol-Paraffin solution applied to wounds by spray and covered with gauze. Dress again every 24 hours. Very little of it is required. It saves pain, as it is easily removed. Eliminates the Carrel tube.—J. E. Sweet, B.M.J. ii./17, 249.

Dichloramine-'T' in Oil 2% used in treatment of wounds with satisfaction.—J. T. Morrison and co-workers, L. ii./18,230.

This Eucalyptol and Liquid Paraffin method is now superseded by the use of Paraffin Wax:—

Chlorcosane. A chlorinated paraffin wax in the form of a light yellow oil slightly heavier than water. Employed chiefly as solvent of Dichloramine-'T.'

Manufacture.—Hard Paraffin of melting point 50° C. or higher is heated to about 120° C. and chlorinated. The temperature while the gas is being quickly passed into it should be kept within 125—140° C. Continue until the paraffin has increased in weight 45 or 55%. Hydrochloric Acid is evolved. The oil while still warm is then shaken vigorously with 5% of its weight of dry sodium carbonate and filtered.

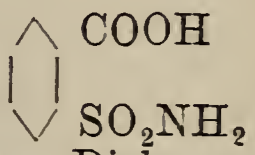
The liquid is now ready for use—it is described as of light yellow colour, with a viscosity between that of Olive Oil and Castor Oil, without odour and bland in use as a nasal spray or when placed on wounds.

To prepare a solution of Dichloramine - 'T' (of which it will dissolve 8·5 to 10%, 7·5 to 8% is strong enough), a portion of the oil, *e.g.*, a quarter, is heated to 75 or 80° C. and the Dichloramine - 'T added. It dissolves. Then add remainder of the Chlorcosane. This solution is employed for nasal irrigation and for wounds.

Carbon Tetrachloride 10% may be added to make the solution more fluid for spraying.—H. D. Dakin and E. K. Dunham, B.M.J. i./18,51.

p-**Sulphondichloramino-benzoic Acid.** $Cl_2NO_2SC_6H_4.COOH$ = 270·065. **Halazone.**

To sterilise ordinarily contaminated water in 30 minutes, 1 in 300,000 is sufficient.

Manufacture.—*p*-Sulphonamino-benzoic Acid 

= 169·161 is first made. Add Commercial Sodium Dichromate 250 Gm. to a mixture of Sulphuric Acid (conc.) 200 Cc., and Water 600 Cc. Then add crude Toluene *p*-Sulphonamide 100 Gm. (readily made from *p*-Toluene Sulphone Chloride, a waste product), and heat with reflux condenser 1 hour. The reaction at first is vigorous. On cooling, wash the separated crystals well with cold water and dissolve in dilute Sodium Hydroxide solution in slight excess. Filter hot, add excess of Hydrochloric Acid and when cold filter off the precipitated acid and wash well with water and dry. Yield is about 80% of theory.—Remsen. Ann. 178, p. 298 (1875).

Now dissolve 20 Gm. of the *p*-Sulphonaminobenzoic Acid in 200 Cc. approximately Normal Sodium Hydroxide Solution (2 molecules), warming if necessary. Add about 200 Gm. crushed ice and saturate with a rapid current of Chlorine. Shake while the gas is being introduced, adding more ice if temperature rises. The Sulphondichloramino Acid precipitates at once. Filter off, wash with cold water and dry *in vacuo* on a porous plate. Powder and preserve in bottles. Yield is practically theoretical.

Soluble sparingly in water, insoluble in chloroform and petroleum. Soluble also in excess of cold Sodium Hydroxide solution, but with less quantity or with feebly alkaline salts, *e.g.*, phosphates or borates, hydrolysis occurs.

Assay.—0·1 Gm. is dissolved in glacial acetic acid and Potassium Iodide added. Titrate with N/10 Thio. of which 14·8 to 14·9 Cc. will be required.

Tablets.—To prepare, powder the Sulphondichloramino - acid 4, with dry Sodium Chloride 92 and add dried Sodium Carbonate 4 (or dried Borax 8%). Pass through a No. 40 sieve (no lubricant required or indeed is to be used), and compress into tablets weighing 100 mgr.

Each tablet so made contains 4 mgr. of the Disinfectant—sufficient for a litre or a quart of reasonably heavily contaminated water. —H. D. Dakin and E. K. Dunham.—B.M.J. i./17,682.

ACIDUM IODICUM.

$HIO_3=175{\cdot}928$. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline powder very soluble in water. Iodic acid is a remarkable deodorant and preservative even in a 1 in 2,500 solution, It is employed in ozæna for deodorising offensive urine, as an irrigant in empyema (strength 1 in 500) and for leg ulcers, as a mouth wash, *e.g.*, in inoperable epithelioma, and as a throat swabbing in diphtheria. Found useful in extensive burning (1 in 500 solution). Internally a drachm of a 1 in 100 solution, well diluted, has been given in gastro-intestinal sepsis, as in typhoid fever. The calcium salt is principally employed

Calcii Iodas. $Ca(IO_3)_2, 6H_2O=498{\cdot}006$. *Syn.* CALCINOL.

Dose.—3 to 4 grains (**0·2 to 0·25 Gm.**), three times daily in solution.

Tasteless, odourless powder, soluble in 380 parts of water at 11·5° C. Contains 51% of iodine and 16% of available oxygen. Acts equally well in an acid or alkaline medium as a deodorant and anti-putrefactive.

Uses.—Is particularly useful as a dusting powder. **Lotio Calcii Iodatis** (saturated aqueous solution) is employed in septic and suppurating wounds, and a **Gauze** (3% strength) may be used for the same purpose. Healing ensues with the production of a dry scab. A warm saturated solution is used as a **vaginal douche** or bladder irrigant; efficient as a mouth wash or gargle. Should prove useful in **dentistry**, *e.g.*, in pyorrhœa alveolaris. An **ointment** 10 grains to the ounce has been found to be a specific in various forms of eczema. A solution or a 10% insufflation with bismuth carbonate may be useful in otorrhœa. May prove of value in fœtid breath.

Hypodermic injections of from ½ to 2 drachms of an emulsion of 3 drachms of the Iodate in 1 ounce of glycerin have been used in tuberculous joints.

Hydrargyri Iodas, $Hg\ (IO_3)_2 = 550{\cdot}44$.

Dose.—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**).

A white powder, strongly antiseptic. *Soluble* with the addition of Sodium Chloride to the extent of 2% in water. Potassium Iodide also assists solubility. It has the scientific advantage of attacking disease organisms with both its component ions, and it contains only half as much Mercury as the Perchloride. In a pronounced sycosis of hairy parts of the face an ointment containing 20 grains to the ounce produced an effectual cure.

Bismuthi Subiodas, a fine white unirritating powder.

Insoluble in water. In lupus as dusting powder and ointment (20 grains to the ounce), and in scrofulous glands as a dusting powder.

Sodii Iodas, $NaIO_3=197{\cdot}92$. 1½ grains in 5% solution (about saturated) have been injected for acute and chronic articular rheumatism.

Zinci Iodas.—$Zn(IO_3)_2=415{\cdot}21$. White powder.

Soluble about 1 in 50. Use similar to that of calcium iodate.

ACIDUM LACTICUM.

(*Off.*), and numerous Pharmacopœias. $CH_3.CHOH.COOH=90{\cdot}063$

Dose.—15 to 30 minims (**1 to 2 Cc.**), well diluted. U.S. *average dose* 30 minims.

A colourless, odourless, syrupy, sour liquid, obtained by the fermentation of milk sugar by the action of *Bacillus acidi lactici.* Lime or Zinc Oxide is used to neutralise the acid as formed. The respective lactates are then decomposed. It has Sp. Gr. 1·21 and contains 75% of hydrogen lactate. Fr. Cx. has Sp. Gr. 1·24 at 15° C.—is nearly pure.

Solubility.—Is miscible with water, alcohol, and ether; it coagulates milk and albumin.

Uses.—It is employed topically to destroy morbid growths, in diphtheria, &c., and internally for infantile and tropical diarrhœa, for diabetes, dyspepsia, and to allay cough in phthisis, and as a stomachic tonic in combination with iron and lime. Has been used locally in tuberculous ulceration of the pharynx and larynx. As a paint, or paste with kaolin, or as a 50% injection has been used in lupus, but is painful.

In chronic catarrh of the bladder, lactic acid drinks arrest the ammoniacal decomposition of the urine, both inside as well as outside this organ, dissolve the salts and are said to stop the development of micro-organisms.

Lactic Acid in metabolism—in pathological conditions. In pregnancy, etc.—Q. Jl. Med., July, 1910.

Test for in vomit, &c., *vide* 'Examination of Stomach Contents.'

Butyric Acid—$C_3H_7.COOH=88{\cdot}084$.—(with the characteristic evolution of hydrogen) may also be produced by the above process if the fermentation proceed too long, or if the lactic acid is not neutralised as it is produced by the presence of calcium carbonate or zinc oxide.

Acidum Lacticum Dilutum (B.P. 1885). Sp. Gr. 1·040. Lactic Acid 3 ounces, Distilled Water *q.s.* to 1 pint. *Dose.*—½ to 2 drachms (**2 to 8 Cc.**).

In gonorrhœa a few drops of the pure acid have been injected just beneath the membrane of the cervix. It is useful for infantile diarrhœa with green stools.

Laryngeal tuberculosis treated by application of (Lake's) mixture of Lactic Acid 50%, Formalin 7%, and Carbolic Acid 10%. May be diluted to ½ strength —L. ii./06,1278; B.M.J. i./07,1421. May cause pain.—B.M.J. ii./05,1191. (Opinions differ as to value of the treatment). Ulcer on the vocal chord cured with lactic acid.—Pr. Aug./09, 237

Arguing on the theory that lactic acid is apparently a natural protective substance when produced as it is in the case of cancer of the stomach and that sour milk is a country remedy for it in Russia, the acid has been tried for the complaint externally, a dressing of 0·25 to 1% was applied and internally tablespoon doses of a 1 in 45 solution. Improvement resulted.—M. 1908,115.

Injectio Acidi Lactici, C.L.T.E.

Lactic Acid 4 to 6 drachms, Water to 1 ounce. Is directed to be introduced by means of a submucous laryngeal syringe into the tissues of the larynx.

Nebula Acidi Lactici.

Lactic Acid 1, Distilled Water 15. Of some use in diphtheria; appears to have the effect of dissolving the membranous exudation.

Spiritus Acidi Lactici.

Lactic Acid 3, Castor Oil 2, Lavender Water 4, Alcohol 90% to 24. Suitable for treatment of alopecia areata. To be rubbed in gently at first, later with some friction.

Calcii Lactas, (*Off.*). $\left[C_2H_4\left\{\begin{matrix}OH\\CO.O\end{matrix}\right.\right]_2 Ca+5H_2O \doteq 308{\cdot}26.$

Dose.—10 to 30 grains **(0·6 to 2 Gm.).**

An opaque, white, crystalline powder, antiseptic and stomachic, and given for rickets; soluble in water. 1 in 15 if freshly prepared.

Manufacture.—Pure Calcium Lactate can be made by precipitating the cold saturated Solution with Acetone and then washing first with Acetone and then with Ether. B.P. requires 93% pure.

Flavoring.—It is practically tasteless; if desired to flavor any Glyl or Syl may be prescribed.

Urticaria and chilblains have been treated with it. Chilblains are stated by Sir A. E. Wright to be caused by thinness of the blood, which permits of effusion into the tissues and consequent swelling and inflammation. Is useful to give prior to operation to increase coagulability of the blood, but in a case cited not suitable *per os*. Further, hypodermically produced painful coagulation locally and collapse. Strontium Lactate *per os*, then thought of. *q.v.*—L. ii./06,436.

According to Dixon must be *injected* to produce the effect.—*c.f.* p. 249; *vide* also B.M.J. i./09,999.

For chilblains in the adult 15 grain doses dissolved in 1 ounce of Chloroform Water with ½ to 1 minim of Capsicum Tincture, thrice daily one hour before meals, to be continued over six weeks. Constipation which may be expected is to be corrected by Senna Pod Infusion.

Hæmoglobinuria, œdema of the feet, boils, urticaria, erythema, lichen planus, gouty pruritus, pruritus ani, also treated with success.

A case of pruritus hiemalis. Its reappearance coincided each year with the first frosty nights. Local treatment proved ineffective. Cure was effected in three weeks' time by Calcium Lactate 15 grains three times a day an hour before meals.—Pr. Nov. 1911, p. 719.

In hæmophilia use of Calcium Lactate or Chloride recommended.—M.P.C. ii./11,377.

The salt is readily oxidised in the system with result that the basic radical is placed more fully at the disposal of the organism than in the case of the Chloride being administered.—Luff. B M.J. i./09,261. P.J. i./09,150.

Scurvy, associated with diminished alkalinity of the blood brought to normal by 10 grain doses of Calcium Lactate.—Sir A. E. Wright. L. ii./08,725.

In eczema where there is much œdematous infiltration into the skin with redness and itching often given with benefit, *e.g.*, 5 to 15 grain doses thrice daily before meals, or 1 drachm doses two or three times a week. To be continued only until the symptoms of œdema and itching have subsided If it constipates, correctives, Sulphur or Senna, to be given.—B.M.J. i./09,1344.

Color blindness treated by Calcium Lactate—the theory being that it stimulates metabolism, hence ought to stimulate retinal cells to respond more to color sensations. A case in which response to green was *nil* was able to detect things of this color after only 10 grains of the salt. Two other cases with larger doses gave equal encouragement.—B.M.J. ii./09,315.

Eclampsia thought by one observer to be due to paucity of calcium content in the blood. 15 grain doses given.—Pres. 1910, 35, 89; Jan. 1911, p. 3.

Hæmorrhage. Post-partum treated.—Pres. 1910,89. Six multiparæ, who had suffered more or less from hæmorrhage in previous confinements treated with 3 Gm. doses *pro die* for some time before delivery. In all the hæmorrhage appeared to be less than normal, but the treatment was not entirely satisfactory. In a girl of 13, however, suffering from metorrhagia which had refused to yield to Hydrastis or Ergotin, Calcium Lactate arrested the discharge in three days.

In recent epilepsy it has not been proved that the blood coagulates more rapidly in the fit period, but Calcium Lactate alone and combined with Potassium Bromide has been given with satisfactory results. The lime salts appear worthy of further study in treating epilepsy.—L. ii./10,219.—Pres. 1910, 18,214.

For 'dead fingers' Calcium Lactate in 10 grain doses—*t.d.s.*—B.M.J. /12,872.

In a case of erythema with periodical return drachm doses most effectual to our knowledge.

Spasmodic rhinorrhœa—a case of an annual sufferer from hay fever relieved by tapping antrum and washing out, giving Vaccine from the *B. coli* isolated in pure culture from the pus and full doses of Calcium Lactate.—L. ii /12, 1312.

For further notes on the administration and removal of lime salts from the tissues, vide Calcii Chloridum.

Tablets of Calcium Lactate contain 5 grains each.

Liquor Calcii Lactatis. *Dose.*—½ ounce (=15 grains Calcium Lactate). Calcium Carbonate 4, Lactic Acid (75% strength) 8, Water to 180. This has the advantage of keeping satisfactorily.

Bold treatment spread over several days with Calcium Lactate in cachet followed by a good half pint or more of water is valuable in the urticaria following operation, as also in the ordinary type of urticaria. In old people with impaired circulation Calcium Lactate is liable to thicken the blood too much. It is desirable to give a cardiac tonic to drive the blood through peripheral circulation.—Campbell Williams.

Ferri Lactas (Ferrous), Fr. Cx., **P.Belg., P. Jap.** $(C_2H_4OH.COO)_2Fe+3H_2O=287{\cdot}988$

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

In greenish-white crystals, soluble 1 in 60 of water; when taken internally is easily assimilated by the system.

Calcii Lactophosphas.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Crystalline or amorphous powder. Is often a mixture of equal parts of calcium lactate and (dibasic) calcium phosphate. Soluble in water. Stomachic tonic. In cardiac disease useful (Brunton).

In coagulability of the blood, experiment showed this salt, even in 15 to 30 grain doses, produced little or no effect.—L. i./08,96 *c.f.* Calcii Lactas.

Plumbi Lactas. $(C_2H_4OH.COO)_2Pb=385{\cdot}31$.

A white crystalline powder, soluble in water.

Sodii Lactas. $C_2H_4.OH.COONa=112{\cdot}055$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Usually in form of yellowish syrupy liquid miscible with water, containing 75% of the salt. Large doses are said to be hypnotic.

In scorbutic symptoms is better than sodium citrate.—L. ii./08,725.

Gas gangrene rapidly cured by injection of 20 Gm. in an acute toxæmia. B.M.J. i./17, 53.

For further details of gas gangrene see Vol. II.

Syrupus Calcii Lactophosphatis (*Off.*).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Mix Calcium Lactate 7·5 with Water 40 and add Concentrated Phosphoric Acid 4·5 (volume), dissolve and add Orange Flower Water 2·5. Filter and dissolve Refined Sugar 70 in the solution without heat and add Water *q.s* to make 100.

Dusart's Syrup. *Dose.*—2 drachms to ½ ounce (**8 to 15 Cc.**).

Calcium Carbonate 9, Lactic Acid 75% 22, Phosphoric Acid 10% 88, Water *q.s.* Dissolve the Calcium Carbonate in the Lactic Acid diluted to 108 with Water with the aid of heat. Cool and add the Phosphoric Acid, and make up to 370. Dissolve in this Sugar 623, and add Spirit of Limes 7. Mix and adjust to 1,000. *All parts by weight.*—Y.B.P. 02,232.

Liquor Calcis Lactophosphatis. LACTOPHOSPHATE DE CALCIUM DISSOUS. FR. CX.

Rub Dibasic Calcium Phosphate 17, smoothly with Water 964, add Lactic Acid 19 (FR. CX., Sp. Gr. 1·24, practically pure acid) —all by weight. Shake to dissolve; filter.

Syrupus Calcii et Ferri Lactophosphatum.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Dissolve by aid of slight heat Ferrous Lactate 150 grains with Potassium Citrate 150 grains in Water 1 ounce, and add to Syrup of Calcium Lactophosphate 20 ounces. We acknowledge the N.F. for the suggestion to use Potassium Citrate. Our preparation has, however, always been 1 grain Ferrous Lactate in the drachm, *i.e.*, double the strength of that in N.F. This strength is therefore retained.

ACIDI LACTICI BACILLI.

It will suffice to give here the salient points of Prof. Metchnikoff's well known Lactic Acid Bacillus Therapy.

In Vol. II. we deal with the introduction of this method of treatment and numerous abstracts from the literature of the subject together with details of the methods of examination of Lactic Acid Bacilli Preparations.

Biolactyl, ***Fermenlactyl**, (T.M. 297401 class 42 and 348311 class 3 assoctd.) ***Lactigen** (T.M. 310058), ***Lacteol** (T.M. 317182), ***Lactobaciiline** (T.M 321882, 290293, class 3 and 290294, 321883, class 42), **Lactone**, **Lactilloids**, ***Sauerin** (T.M. 297939), and ***Trilactine** (T.M. 302646) are commercial preparations of Lactic Acid Bacilli. **Liquid Cultures** are also on the market. These latter only remain active a month or less.

If properly made there is no reason why Lactic Acid Bacilli, in tablet form, should not keep good for months or even years.—W. H. M.

***Trilactine Tablets** contain *B. Caucasicum* as their principal active constituent, together with a proportion of Hüppe's Bacillus and *B. Acid. Paralactic* (Gunther).

They are intended for therapeutic use to be taken *per os* or for curdling milk (*vide infra*). For the former they are best taken in conjunction with a little milk sugar (the bacillus *does not ferment cane sugar or maltose*), *e.g.*, dissolved in a little boiled (and cooled) water.

Dose.—Three to six per diem after meals (but *c.f.* also Trilactine Milk).

Trilactine Tabellæ with Chocolate basis are also prepared.

Dose and *uses* as above.

Trilactine Tablets, Intestinal, *i.e.*, so coated as to render them less likely to dissolve in the stomach juices than in the intestinal tract, are also prepared. These should prove a considerable advance on the ordinary form of tablet when taken as such. (These are not intended for the curdling of milk.)

The treatment, according to severity and nature of the case, extends over one to three months.

***Patient must rigorously avoid*—**

In the course of treatment such foods as gravy, meat jelly, meat extracts, white of egg, fat meat, high game, &c., which would act as culture-media for proteolytic bacilli.

Lactobacilline-Glycogen Tablets contain in addition to Metchnikoff's Lactic Acid Bacillus, the spore bearing amylolytic organism *B. Glycobacter.* This organism converts amylaceous substances into sugar in the intestine, and is said by Metchnikoff to be a favourable addition.—Y.B.P., 1913, 246.

Lactic Acid Bacilli—Curdled Milk. *Trilactine Milk.

Dose.—1 pint or more (less if not tolerated) per diem, divided into 2 or 3 portions.

After the bacilli have appeared in the stools (*vide* "Uses") one daily dose first thing in the morning or evening is given. It is usually preferred during or after meals, but if taken on an empty stomach the organisms will pass through to the duodenum with less contamination with the stomach juices. It is desirable to undergo the treatment for 3 weeks, then stop for a period before proceeding again.

The patient should prolong the treatment. It should not be given up the second week if flatulence is produced or constipation increased.

Preparation of Curdled Milk.—This forms an agreeable mode of treatment with active Lactic Acid Bacilli. Absolute sterilization of the milk before introducing the lactic organisms is essential. Certain pathogenic organisms—*e.g.*, the tubercle bacillus, persist if present in a sample of milk even after the milk has soured. An organism dividing three times an hour (as mentioned in a contribution on "Surgical Methods" by Sir W. Watson Cheyne), which is a fair average, will give rise to something like thirty-three million bacteria in twelve hours. To kill all organisms in milk would necessitate exposure to a temperature of 108° to 120° C. (226° to 248° F.), which would give the milk an unpleasant flavour. Pasteurising at 140° F. is not sufficient to kill *B. tuberculosis* or the spores of the butyric bacilli. Metchnikoff, therefore, advised boiling for several minutes. For safety an hour would be preferable, but previously pasteurised milk as is supplied in London and other large cities, may be used after 'bringing to the boil.'

We find the organism grows best at about 44° C. (110° F.) *N.B.*—Acid production ceases at a slightly higher temperature.

The required quantity of milk (a pint or a quart being a customary day's supply), cooled to about 40° C. (104° F.) (this can be done expeditiously by standing the saucepan with lid on, in a basin of cold water), is placed in a suitable jar or basin so arranged with a small light beneath that a temperature of 40° to 45° C. (104° to 113° F.) —not higher—can be maintained for eight to ten hours,—a ventilated dry heat (hot air) will work satisfactorily. For a pint of milk two or more active Lactic Acid Bacilli Tablets—the quantity varies with the different brands—are crushed, *e.g.*, with a spoon, in a little of the previously heated and then cooled milk (reserved for the purpose), to make a paste and stirred into the remainder of the milk in the jar. For a quart four or more tablets should be employed. The milk will then (or a little later *v. infra*), have formed a junket ready for consumption. If the Curdled Milk be 'over made' (*i.e.*, much whey formed on the top), the heat must be reduced till the correct adjustment is ascertained.

Curdled Milk may be taken, according to taste, either with sugar, or with cream and sugar, or with sugar and a little powdered cinnamon, or ginger as flavoring. It is usually taken 12 to 24 hours after souring has been started. Metchnikoff recommends it to be made from skimmed milk "as it is undesirable to absorb too much fatty matter." Providing one has a strain of organisms that does not decompose fat to too great an extent and produce a bitter-tasting product, this, perhaps, is open to discussion. The remarkable fact is that we find in our experiments that at any rate after 8 to 10 hours *B. Caucasicum* is in great preponderance in the cream when ordinary milk is used,—the bacilli appear to be carried up with the milk fat.

N.B.—The milk must be free from preservatives and in all respects as fresh and pure as can be obtained.

It is sometimes advised to inoculate from soured to fresh milk day after day. If this is done the cocci tend to outgrow the bacilli, and as the Streptococci form less lactic acid than the *B. bulgaricus*, the milk would thus become poorer in lactic acid, hence the need for the use of a fresh full strength culture for souring milk.—L. ii./10,402. B.M.J. ii./10,1584.

Pharm. Form. says acid-production in milk begins immediately the milk is drawn from the cow, and in 48 hours sufficient acid (1%) is produced to coagulate the milk at normal temperature. For this reason dairy farmers add sodium bicarbonate by rule of thumb, to counteract acidity and act as preservative. Some medical men think sodium lactate to be provocative of diarrhœa, and object to the addition.

Uses, Contra-Indications and References to Lactic Acid Bacilli Tablets & (plain) Curdled Milk. —Both the Tablets and the Curdled Milk are used for summer diarrhœa in children, diarrhœa and constipation in adults, skin affections, such as eczema and psoriasis, acne and furunculosis, infective disorders of the intestinal tract, such as typhoid, dysentery, for intestinal tuberculosis and tuberculous diarrhœa, and for cancer of the stomach or intestines, and in enteritis and colitis generally. Also as a cholagogue in hepatic congestion and gallstones, and in threatened appendicitis. Beneficial in migraine, neurasthenia, loss of appetite and allied disorders.

The Milk acts as a lubricant to the digestive tract, forming a pleasant article of diet, and may with advantage be taken in comparative health as a nutrient and antiputrefactive.

Contra-Indications.—In some cases, notably in chronic acid gastritis, the stomach will not tolerate the Curdled Milk. Many cases of enteritis are aggravated by milk in any form. Personal idiosyncrasy also enters into consideration. Suitable cases, those in which abnormal putrefaction of proteid. Unsuitable, where symptoms due to carbohydrate fermentation.—G. Herschell, B.M.J. i./10,21.

Medicated Trilactine Milk—*Martindale.* Experiments which we conducted (*c.f.* B.M.J. ii./09,1232) to determine the proportions of certain substances that can be incorporated with soured milk in the presence of the growing organism, *B. Caucasicum, e.g.*, Arsenic, Iron, Iodides, etc.—which have to be given therapeutically over a prolonged period of time,—the medicaments being dissolved or suspended in the previously sterilised milks before insemination with Trilactine Tablets, showed the following as the *limits* of the medicaments permissible for growth of the organism :—

Proportion to the Pint.	*Acidity found.*	*Bacterial growth.*
P1 Arsenious Acid, ⅕ grain	1·21%	Fairly good.
Bismuth Salicylate, 200 grains	0·75%	Not very marked.
Carbolic Acid 12 grains	1·04%	Good.
Ferric Chloride, 30 grains	1·1 %	Good.
Guaiacol, 24 minims	0·92%	Fairly good.
Iron Peptonate Solution, 1 to 2 ounces ..	1·12%	Good.
Naphthol β., 20 grains	1·08%	Good.
Potassium Citrate, 20–40 grains .. .. (Large amount of whey).	0·9 %	Not marked.
Potassium Iodide, 20 grains	0·99%	Good.
Resorcin, 10 grains..	0·93%	Good.

Smaller quantities of the medicaments, *taking doses into consideration*, could be tried therapeutically. For further details *vide* Edn. XV., p. 53.

These limits were arrived at by a long series of experiments using gradually increased quantities of the medicaments.

Control for acidity with these experiments showed 0·93% Lactic Acid in the same period of time.

The principle of this medicated milk treatment is that the simultaneous administration of Lactic Acid Bacilli (in a medium native to their growth) and intestinal antiseptics might have as *modus operandi* that the antiseptics hasten the destruction of the proteolytic organisms, thereby giving the saccharolytic organisms a better chance of acclimatising themselves.

Liquid Lactic Acid Bacilli Preparations.

Some hold that Liquid Preparations are preferable to Tablets. From long experience we find that Tablets produce a curd perfect both bacteriologically and dietetically if they are of correct composition.

It was found possible to diminish the number of micro-organisms in wounds by means of Fermented Lactic Bacilli baths, douches and dressings. The effects were not due to the Lactic Acid merely, but to combined action.—L. ii./16,871.

“Trilactine” Ferment (Liquid).

A liquid culture of *B. Bulgaricus* in a medium containing lactose, malt extract and peptone bouillon. The preparation will keep good for at least a fortnight from the time of making, and appears to be well suited for the purpose for which it is intended.—B.M.J. i./11,144.

Local Use of Lactic-Ferment Preparations.—A fresh culture of lactic acid organisms has been used to free the urethra from bacteria, *e.g.*, in gonorrhœal infections. An ounce injected night and morning for a week resulted in lactic organisms only being found. Weak permanganate lotion completed the treatment.—B.M.J. ii./08,1605.

For gonorrhœal and mixed infections of the female genital tract. After disinfection, the lactic fluid is introduced into the vagina. Secretions become normal in a few days.—B.M.J.E. ii./08,20; B.M.J. i./10,192.

Cystitis treated by irrigation of the bladder with *B. Bulgaricus*—successful. Destroys septic organisms.—L. ii./15,330. Also employed with satisfaction in treatment of hypertrophied prostate with frequent micturition, tenesmus and alkaluria.—Hagner, B.M.J.E. ii./15,28.

Buttermilk, Composition of.—Protein 3, Fat 0·5, Sugar 4·8, Water 91 per cent.

Contains less fat than soured milk. The ordinary Lactic Acid Bacilli found in this are not so active nor resistant as those contained in Bulgarian Sour Milk. Milk in any form, however, in sufficiently large quantity tends to lessen internal putrefaction.—B.M.J. ii./09,923.

Erysipelas has been cured by Buttermilk internally and locally.—F. S. Arnold, Pr., May, 1913,300.

ACIDUM NITRICUM.

"*Poisonous—Not to be taken.*" *For Conditions of Sale v.p.* 47.

HNO_3=63·018.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

(*Off.*) Sp. Gr. 1·42, contains 70% by weight hydrogen nitrate. U.S. 68% Ph. Ned. 50%, P. Helv. 25%; Fr. Cx. 63·64%.

Preparation.—Distillation of sodium or potassium nitrate and sulphuric acid.

Use.—Strong oxidising agent. A caustic to warts and condylomata.

Quantitative Estimation.—By reduction with nascent Hydrogen into Ammonia, which is precipitated as Ammonio-Platinic Chloride or titrated with Standard Hydrochloric Acid.

A direct method of estimation is with the aid of Nitron (diphenylene-anilo-dihydro-triazole, which gives an insoluble nitrate—the precipitation being quantitative. It also precipitates Picric Acid.—C.D. i./17,286.

Acidum Nitricum Dilutum (*Off.*).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains (*Off.*), U.S. and P. Helv. 10% by weight. Ph. Ned. quadri-normal. Fr. Cx. 10% approx. Tonic and biliary stimulant.

Incompatible with alkalis, sulphides, hyposulphites, ferrous sulphate, and alcohol.

Antidotes as for Hydrochloric Acid, *q.v.*

Chloroform in 5 drop doses every ten minutes will prevent the convulsions following the inhalation of nitrous fumes, as in the accidental breaking of a bottle of nitric acid.—C.D. ii./05,130.

Poisoning by small quantity taken in mistake.—B.M.J. ii./08,1679.

Acidum Nitricum Fumans. '*Poisonous—not to be taken.*' Sp Gr. 1·5. (P. Jap. 1·486 to 1·5; P.G. has 86%, Sp. Gr. 1·486).

A reddish-brown liquid, giving off yellowish-red fumes. Contains about 91% by weight of hydrogen nitrate. Used as a caustic.

Acne pustulata should be stabbed with a pointed stick dipped in Nitric Acid.—B.M.J. i./01,513. For lupus as caustic.—L. ii./08, 471.

Acidum Nitro-hydrochloricum, U.S. (Strong).

Nitric Acid 9, Hydrochloric Acid 41, to produce 50. ‘*Poisonous*.’

Aqua Regia is Nitric Acid 3, Hydrochloric Acid 4. ‘*Poisonous*.’

ⓅACIDUM OXALICUM.

$(COOH)_2 2H_2O = 126·058$.

White crystals soluble in water about 1 in 9; a powerful poison. Manufactured by acting upon wood, sugar, starch, etc., with Nitric Acid. The cerium and iron salts are used in medicine, *q.v.*

The toxicity of this acid in dilute solution and of its salts is due to the fact of their forming an insoluble calcium salt, a sufficient quantity of calcium in solution being essential for the welfare of the organism. Strong solutions of the acid are poisonous by corrosive action.—P. May.

Antidotes.—Apomorphine Injection, Calcium Saccharate Solution, Chalk, Castor Oil, Stimulants.

Sal Limonis.—SALT OF SORREL or SAL ACETOSELLA, SALACETOS, consists of a mixture of Acid Potassium Oxalate (or Binoxalate) $COOH.COOK + H_2O = 146·134$ and Potassium Tetroxalate (or Quadroxalate) $COOH.COOK + COOH.COOH + 2H_2O = 254·176$ (Bernthsen). It is used for removing ink stains, iron mould, cleaning leather, &c., and removing the colour from calico printing. Has been given for scurvy. *Dose.*—$\frac{1}{4}$ to $\frac{1}{2}$ grain. Is very poisonous, with which word it must be labelled.

The Binoxalate according to Tyrer contains $2H_2O$.—P.J. ii./12,157.

“ Poisonous—Not to be taken.”—Soluble Salts of Oxalic Acid. In Ireland according to the Sale of Poisons Act (Ireland) 1870, *Oxalic Acid and all Oxalates are Part II. Poisons (of that Act), therefore can only be sold by registered persons. For further Conditions of Sale see p.* 47.

‘POTASSIUM BINOXALATE’ is usually understood to be Acid Potassium Oxalate as above.

ACIDUM PHOSPHORICUM CONCENTRATUM.

$H_3PO_4 = 98·064$.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

Antidotes.—As for Hydrochloric Acid, *q.v.*

Hydrated Phosphoric Acid, containing 66·3% of hydrogen orthophosphate, corresponding to 47·4% of phosphoric anhydride; Sp. Gr. 1·5. Commercially, it is also prepared, having Sp. Gr. 1·75, and containing 64·3% of the anhydride = 88·8% H_3PO_4 (U.S. is 85% H_3PO_4). If of this strength it may be reduced to B.P. strength by adding to each 3 parts by weight 1 part of distilled water.

FR. CX. 50% by weight of H_3PO_4. Sp. Gr. 1·349.

‘**Acidum Phosphoricum**’ P.G.V. and PH. NED., is 25% H_3PO_4.

See Vol. II for Analysis and further details

Acidum Phosphoricum Dilutum (*Off.*).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains *Off.*, U.S. and P. Helv., 10% H_3PO_4 Sp. Gr. 1·057.

Dilute Concentrated Phosphoric Acid (66·3%) 106·3 Cc. with Distilled Water. *q.s.* to 1000 Cc.

Incompatible with alkalis, ferric chloride, lime salts.

Uses.—A nerve tonic and hæmatinic. Said to increase the proportion of phosphates in the red blood corpuscles, and to increase the coagulability of the blood. Well diluted, is a pleasant cooling drink in fevers, and relieves thirst in diabetes. It renders iron preparations compatible with astringent vegetable infusions.

ACIDUM PICRICUM (*Off.*).

P. Jap. ; Fr. Cx. *Syn.* Carbazotic Acid ; Trinitrophenic Acid.

$C_6H_2.OH.NO_2.NO_2.NO_2$ [1 : 2 : 4 : 6]=229·084.

Dose.—$\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**).

Is formed by cautiously adding phenol to fuming nitric acid, heating the mixture, and purifying by re-crystallizing. It is in yellow-shining, bitter tasting crystals, which melt at 125·5° C.—the yellow liquid may be distilled without decomposition. Heated rapidly to 300° C. in the open it burns. If confined it explodes somewhat more readily than Ammonium Picrate, but with slightly less vigour, when heated in a test tube. The Acid does not explode on striking with a hammer on an iron plate. As a high explosive it is used in shells, *e.g.*, as **Lyddite, Melinite**, etc. It is safe, *i.e.*, it is sufficiently insensitive to shock to prevent it being exploded when struck by projectiles or fired from a gun. T.N.T. is less sensitive to shock than Picric Acid, and is unaffected by water and metals. Nature—per P.J. i./15,19. It precipitates most alkaloids.

Eugene Turpin in 1885 discovered that, provided the initial ignition is of sufficient violence, pure Picric Acid is one of the most powerful explosives. He also showed that the substance could be poured in a molten condition or be pressed in to shells or grenades. Turpin's Shell which is essentially the same as modern high explosive-shell, comprises the shell body filled with the acid the point of the shell containing priming which is exploded by means of a percussion detonator. As the substance melts somewhat high, and this is inconvenient for working, various additions have been made to lower the melting point, *e.g.*, Nitro-Naphthalene, Camphor, T.N.T., etc. Various names were adopted, *e.g.*, Melinite, Lyddite, Schimose (Japanese) etc.

Many accidents have occurred in its manufacture and filling—generally attributed to contact with metal oxides, chalk, brickwork, etc., and hence the formation of salts, the intermediate formation of these picrates resulting in the detonation of the acid. Picric Acid has been largely displaced by T.N.T—From ' High Explosives," by E. de W. S. Colver, 1918.

Solubility.—1 in 90 of water with yellow colour, and 1 in 10 of alcohol 90%, and in ether about 1 in 20.

Quantitative Estimation.—Nitron (*c.f.* Acid Nitric) precipitates picric acid and can be used for the purpose.

Determination of Picric Acid and Ammonium Picrate with Titanious Chloride.—A. A. Boon and J. Ogilvie, P.J. ii./16,213.

Use.—Solutions or ointment are applied in the treatment of burns, erysipelas, pruritus, eczema, chilblains and gonorrhœa.

In phthisis, *inhalation* of Vapour from 60 Gm. dissolved in 1000 Cc.

Water heated to boiling,—daily for 2 to 3 hours gives good results, even cures.

In stomatitis mercurialis a watery paste of the acid applied to the parts every 2 days relieves pain and removes ulceration.—M. '08,119.

Poisoning by application of.—A child of 2 to 3 months Severe burn of the foot from boiling water treated with a dusting powder containing varying amounts, 7 to 17% of the Acid. Vomiting and severe diarrhœa. Temperature rose to 100° F., and pulse varied from 100 to 150 General erythema developed, and child died on 22nd day after the accident. —South African Med. Record, July, 1912, per L. ii./12,471.

For further references to toxic action *vide* Edn. XII., p. 51.

Picric Acid 6 grains in 2 grain doses at intervals of some hours taken without harm. Turns urine orange coloured.—Walter Smith, B.M.J. i./17,618.

Lotio Acidi Picrici, 1% aqueous (St. Th. H.).

For burns cotton wool impregnated with this lotion is used. Recommended by H.M. Inspectors of Explosives to keep handy as First Aid for burns.

After 48 hours remove and wash with Potassium Permanganate 5 grains in Water 16 ounces. Washing with weak ammonia and then with hydrogen peroxide removes the stains.—L. ii./08,1025.

The method is not always satisfactory—may cause toxic symptoms. Cleaning the parts and rubbing off blisters with Alcohol—under Chloroform anæsthesia—is preferred by E. C. Milligan, Austral. Med. Jl., Jan. 4/13. *See* abstract p. 119.

Gauze and Wool, impregnated with **Picric Acid,** are prepared.

In naval warfare Picric Acid found efficacious as a first dressing to burns, but subsequently moist, and mild antiseptics found more suitable.—Surgeon-General H. D. Rolleston, B.M.J. i./17,224; L. i./17,258.

Burns due to Cordite were treated on H.M.S. "Lion" and "Tiger" in the Jutland battle with Picric Acid solution. Found a suitable dressing, but if left on too long it dried and was difficult to remove. As a second dressing 5% mixture of Eucalyptus in Olive Oil, sterilised by boiling, and if acid made alkaline by Lime Water.—B.M.J. ii./16,598.

Pigmentum Acidi Picrici et Camphoræ.—Picric Acid 2, Camphor 50, and Alcohol 90% to 100. Ringworm well treated by this Pigment.—A. Savill, Pr. July 13/94.

Sig.—"Inflammable. To be painted all over the scalp twice daily." The hair is to be clipped quite close, and the scalp washed once or twice a week, and covered by a calico cap. Generally the ringworm hairs are loosened, and come away with their bulbous portions in from ten to thirty days. A slight yellow staining of the hair may be noticeable some weeks after treatment. A. W. Williams, Brit. Jl. Dermat., June, 1912. Slightly modified.

C.D. ii./13,931 advises, Picric Acid 1 drachm, Camphor 2 drachms, Alcohol 4½ ounces, to be painted on scalp, after previously washing with Ether, until there are no diseased hairs left.

Unguentum Acidi Picrici, 1 to 3%, for pruritus of scrotum and gonorrhœa.

For burns: Relieves pain and may be left 48 hours without changing. For burns of the eye, Ointment 2% better than solution. Instillation of a little cocaine solution beforehand.—B.M J.E.ii./08,36.

'**Collapsubes**' of Picric Acid Ointment, ½% in soft paraffin basis, are supplied with catheter attachment for urethral medication.

Papillary erosions of the cervix uteri are well treated with saturated alcoholic solution swabbed for three minutes twice or thrice weekly. —B.M.J. ii./05,1205.

Vaccinated surfaces heated by painting with a 4% alcoholic solution 48 hours after insertion of the lymph, lessens the degree of reaction. Makes a kind of natural dressing. Picric Acid is about four times as efficient as phenol as a local antiseptic.—L.ii./11,1397,1570.

Wounds apart from burns have been well treated—*vide* Wounds.

Ammonii Picras.—$C_6H_2(NO_2)_3O.NH_4=246·118$.

Dose.—$\frac{1}{6}$ to $\frac{1}{3}$ grain (**0·01 to 0·02 Gm.**) in solution.

Yellow crystals *exploding* if rapidly heated in a test tube, but without loud detonation. To our knowledge 4 ozs. in a bottle were dropped and the bottle broken on the stone footway without exploding.

A mixture of this and Potassium Nitrate is frequently used as a priming for shells filled with Picric Acid, particularly in Lyddite Shell.—'High Explosives,' by E. de W. S. Colver, 1918.

Soluble 1 in 100 of Water, 1 in 85 Alcohol.

Uses.—This and the Potash Salt have been thought to act like Quinine; they are also used for hardening tissues prior to microscopic examination and as a urine test for albumin, *q.v.*

Ague and chronic malaria are well treated by Ammonium Picrate. It is used, particularly for the latter purpose, in some intensely malarial districts.—Maj. E. E. Waters, I. M. Gazette, March and July, 1913.

Mistura Ammonii Picratis.—

Dose.—½ ounce (**15 Cc.**) thrice daily.

Saturated Ammonium Picrate Solution 30 minims, Syl Aurantii 1 drachm, Water to ½ ounce.

Flavoring.—Alternatively Syl Limonis vel Syl Vanillæ.

Its use is particularly indicated after febrile diseases with loss of appetite and asthenic condition. Generally given with a clean tongue, but even when dirty the salt does not seem to disagree. Never found to have disagreeable after effects. It takes the place of strychnine to a great extent, and is a really valuable drug. In explosive factories it is stated workmen take it as a bitter tonic.—F. Fowler Ward, Ipswich.

We have seen a statement that 12 grains have been given with Chloroform 1½ minims and Water to 1 ounce. Apart from the insolubility it is *doubtful whether this dose is safe therapeutically.*

ACIDUM PYROGALLICUM.

Syn. PYROGALLOL, $C_6H_3(OH)_3$ 1 : 2: 3=126·078.

Dose.—½ to 1½ grains (**0·03 to 0·1 Gm.**) in aqueous solution, or in pills with syrup—freshly prepared, and kept from the light.

Manufacture.—By heating gallic acid.

It has great affinity for oxygen. A specially pure acid designated "Resublimed Medicinal," is prepared for internal administration.

In light small white odourless crystals, with M.Pt. 131 to 132° C., producing a sensation of coolness on the tongue.

Solubility.—One in 2 parts of water, about 1 in 1 of alcohol 90%, and in 10 parts of melted lard.

Uses.—Antiseptic in skin affections and in ringworm. Ointment 2 to 10% sometimes combined with Salicylic Acid 2 to 5% and Ichthyol about 5%. It darkens the skin, used with Silver Nitrate blackens the hair. Large doses poisonous. Seldom used internally.

It is astringent for hæmoptysis in doses of a grain every half hour. It has been prescribed with ergot for this and stated not to cause vomiting nor to derange the stomach.

Pyrogallol stains removed by rubbing with ammonium persulphate, *q.v.*; and rinsing with water.—P.J. i./98,504a.

Lupus vulgaris, if the area is not too large, 40% plaster as caustic, afterwards 10% Ointment, best treatment.—B.M.J. ii./08,1259.

For lupus, 10% Ointment with Vaseline applied a long time (until blister rises), then proceed with 2% Ointment, finally with a weak (0·1%) ointment. —M. '08,121.

Acidum Pyrogallicum Oxidatum (*Syn.* Pyraloxin). A brownish insoluble powder prepared by the action of air and ammonia on Pyrogallic Acid. 3 to 10% ointment for skin affections.

Eugallol, $C_6H_3(OH)_2(CH_3COO)=168{\cdot}104$, Pyrogallol-Monacetate.

Manufacture.—Add Acetyl Chloride 78 to Pyrogallol 126 with stirring. When thoroughly mixed heat to 60° C. ½ hour. Neutralise the syrup with Sodium Carbonate and extract with ether. This product is mixed with 50% Acetone (*i.e.* 2 of product and 1 of Acetone)

A yellowish syrupy liquid, applied in skin affections mixed with an equal quantity of acetone with a brush. **Lenigallol.** Pyrogallol-Triacetate, $C_6H_3.(CH_3.COO)_3 = 252{\cdot}156$ in white powder, is much weaker may be used with zinc paste in acute and chronic eczema.

Manufacture.—Lenigallol is made by combining Pyrogallol 1, with Acetic Anhydride 3, in presence of fused Sodium Acetate 3 at boiling temperature. The oily compound solidifies on cooling, and is recrystallised. M.Pt. 157° C.

In chronic eczema of service in many cases.—L.i./09, 967.

ACIDUM SALICYLICUM (*Off.*).

$C_6H_4.OH.COOH$ 1 : 2 = 138·083. *Syn.* Ortho-oxy-benzoic Acid.

Meta and *para* Oxybenzoic Acids have very feeble action of any kind—either anti-rheumatic or anti-fermentation. Much larger doses—135 and 180 grains respectively—are required to kill rabbits than with Salicylic Acid (60 to 90 grains).—R. Stockman, B.M.J. i./13,598.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in cachets.

Fr. Cx. *Max. single dose* 1 Gm.; max. during 24 hours 4 Gm.

Manufacture. — Salicylic Acid (artificial acid) of commerce is made by H. Kolbe's method devised in 1874, by heating Sodium Phenate in a current of Carbonic Acid, or by a modification of it. The Basic-Sodium Salicylate so formed is decomposed with Hydrochloric Acid. A modification (R. Schmitt's) consists in heating the Phenate and Gas under pressure; this is more economical.

Potassium Phenate is also employed as starting point.—C.D. ii./14,313.

The manufacture of Salicylic Aldehyde—an intermediate product in making Salicycli Acid and Aspirin is covered by Patent 8096/1909, "Process of Manufacture of Phenol—Esters chlorinated in the side chain, and of oxybenzylalcohols, oxybenzaldehydes and oxybenzoic acids," and by Patent 3053/1914, "For preparation of Esters of Phenol homologues halogenised in the side chain."

The Comptroller recommended that licences should be granted for their use to a British firm. By the first Patent, it would be possible to employ Cresol instead of Phenol—a commodity much required for national purposes. —C.D. ii./16,925.

It may also be prepared from Salicin and from Oil of Wintergreen (*Gaultheria procumbens,—Ericaceæ*) and sweet birch (*Betula lenta,—Betulaceæ*). **For internal use** this NATURAL ACID is preferred. An artificial acid, **Physiologically Pure,** is also free from impurities. "**Powdered Acid**" forms the third variety.

In colourless prismatic crystals, odourless, but its dust irritates the nostrils, taste sweetish. M. Pt. 156° to 157° C.

Soluble 1 in 500 of cold water, 1 in 3·5 of 90% alcohol, 1 in 40 of 45%, 1 in 2 of ether, about 1 in 80 of olive or almond oil, 1 in 100 of castor oil, 1 in 200 of glycerin, and 1 in 55 chloroform; soluble also in melted fats and soft paraffin; 20 grains of salicylic acid are rendered soluble in an ounce of water by the addition of 25 grains of borax. Ammonium citrate and sodium phosphate also increase its solubility.

Incompatibility.—Spirit of nitrous ether, quinine salts, sal volatile. An aqueous solution of the acid gives a deep violet colour with a trace of a persalt of iron.

Uses.—Anti-fermentative and anti-putrefactive. For various febrile conditions generally as one of its salts, particularly for acute rheumatism. See also Sodium Salicylate. In stomatitis a saturated aqueous solution is used. Large doses alone act as a direct poison on the heart and respiration. For sweating feet Pulvis Salicylicus cum Talco is used. It is applied locally to corns, warts, and lupus.

Hypodermically, suspended in oil has been injected at seat of rheumatic pain. A saturated aqueous solution as **Rectal Injection** has been used for dysentery of children.

To eradicate stumps left after removal of papillomatous growths 1 to 6% solutions in spirit. It may also be used dissolved with sodium sulphoricinate.—*q.v.*

In treatment of rheumatic fever the acid or the salt employed either kills the organism or neutralises the toxin. The patient should have a large dose at once so as to kill off the microbes while they are still in the blood stream or joints before they have had time to become firmly established in the fibrous tissue or in the valves of the heart.—B.M.J. ii./06,1439.

For scarlatinal sore throats, tonsillitis, compresses of 2% Alcoholic Solution found of value. In gonorrhœa, may prove irritant, necessitating periodical dropping and renewal.—M. 1906.

Typhoid should be treated by 3 to 5 grain doses given with milk so as to be carried more quickly into the bowel.—A. Wilson, B.M.J. i./15,331.

To remove tattoo marks mass Salicylic Acid with glycerin to a dough—apply over the marks with a compress and strips of adhesive plaster and allow to remain in contact for a week. After the first dressing the epidermis over the marks is removed and a fresh application of the Salicylic paste applied. Usually the second application removes.—P.J. i./11,56, *v.* also P.J. ii./10,270 and ii./07,774. *See also* Papain.

Septic wounds treated by hypertonic saline to which 2 to 3 drachms of saturated solution of Salicylic Acid in Alcohol is added to the pint—the crystals thrown out are deposited on the wound. Salicylic Gelatin 2 to 4% also used.—L. G. Anderson and co-workers.—L. i./16,1119.

Elixir Acidi Salicylici Compositum.

Dose.—1 drachm (4 Cc.) in water.

Each ounce represents Salicylic Acid 40 grains, Gelsemium 15 grains, Cimicifuga 15 grains, Potassium Iodide 4 grains.

A proprietary preparation for use in chronic gout and rheumatism, lumbago, and sciatica. It is antirheumatic, analgesic and the eliminative action of small doses of Potassium Iodide is useful.

Ⓟ**Emplastrum Acidi Salicylici Saponatum.** Salicylic Acid 2½, 5 and 10% in Emplastrum Saponis.

Amyl Salicylate. $C_6H_4.OH.COO.C_5H_{11}=208{\cdot}188$

Substitute for Methyl Salicylate, with much less odour. For painting on to rheumatic joints.

Capsules of Amyl Salicylate contain 3 minims (**0·2 Cc.**) for internal medication.

Unguentum Amyl Salicylatis Compositum. *Syn.* **'Amysal.'**

Similar to Methysal Balm *q.v.* but made with Amyl Salicylate. Odour more pleasant.

BORNEOL SALICYLATE. *Syn.* ✱**Salit** (T.M. 258851). In muscular rheumatism and acute neuralgia, by inunction or by painting over affected part. Apply ½ to 1 drachm, with equal quantity of olive oil.

Oleum Gaultheriæ (*Off.*). *Syn.* WINTERGREEN OIL.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

The Distillate from *Gaultheria Procumbens, N.O. Ericaceæ*, and from the bark of *Betula Lenta* (*Betulaceæ*) are practically identical, *c.f.* Methyl Salicylate. *Characters and Tests.*—Colourless liquid with strong characteristic odour and pungent taste. Sp. Gr. 1·180 to 1·187; O.R., 0° to—1°; R.I., 1·537 to 1·539; Soluble 1 volume in 6 of 70% Alcohol at 25° C. Should contain at least 99% Methyl Salicylate determined by the saponification process. Stimulant and diuretic.

Maceration for 12 to 24 hours of the leaves prior to distillation necessary for best yield, the oil being a "ferment" oil not pre-existing in the plant, but occurs as a non-odorous glucoside, which must be hydrolised by the ferment before distilling.—P.J. ii./05,224.

Capsules of Oil of Gaultheria—10 minims in each. *Dose.*—One three times a day or oftener.

The oil has similar properties to salicylic acid. 10 to 20 minims are given every 3 or 4 hours in rheumatism and sciatica. With olive oil externally for rheumatism.

Methyl Salicylas (*Off.*). (98% pure). $C_6H_4.OH.COO.CH_3=152{\cdot}104$. Artificial (or Synthetic) Oil of Wintergreen.

U.S. IX. gives Oleum Gautheriæ and Oleum Betulæ from the bark of *B. lenta* (Sweet Birch) as synonymous with Methyl Salicylate.

A colourless liquid, with odour like above oil. ***Manufacture.***—May be prepared by carefully distilling a mixture of Salicylic Acid 2, Methyl Alcohol 2 and Sulphuric Acid 1. Sp. Gr. 1·185 to 1·192. ***Soluble*** in 90% alcohol, ether, chloroform or glacial acetic acid. Applied covered with impermeable tissue is quickly absorbed.

In local rheumatic pain the most efficient application.—R. Stockman, B.M.J. i./13,597. Also used for furunculous ulcers, orchitis, and mumps.

Bile secretion is increased by Methyl Salicylate *per os* without causing loss of body weight. Animal experiments.—P.J. ii./16,615.

✱ **Methysal Balm** (T.M. 303967).—*Martindale.* *Syn.* **Unguentum Methyl Salicylatis Compositum.**

Contains Methyl Salicylate 7, in combination with Menthol 15%. Also prepared containing 25% and 33% Methyl Salicylate (with Menthol 15%). For analgesic effect in rheumatism. Supplied in **Collapsubes.**

It relieves pruritus and is suitable as a general antiseptic Ointment. For muscular rheumatism of the limbs, which it cures (W.W.W.), it is best applied after fomenting the part with hot water.

Chloral Hydrate 1 to 5% has been suggested as an addition to creams of this kind. Oil of Cajuput is also used.—P.J. ii./08,739.

Linimentum Methyl Salicylatis, *Martindale.*

Methyl Salicylate 20, Menthol 10, Chloroform 10, Camphor 10, Eucalyptus Oil 10, Turpentine Oil 10, Lavender Oil 5, Liquid Paraffin to 100. For use similar to the above.

Opium Tincture or Belladonna Liniment 10 to 20% may be added if required, but they do not mix with the Salicylate Liniment.

Preparations designated **"Betulol," "Linimentum Betulæ Compositum,"** and **Baume Analgesique,** are supplied.

Unguentum Acidi Salicylici Terebinthinatum—Salicylic Acid 1, Oil of Turpentine 1, Lanolin 1.

The above are of value in rheumatic affections, applied to joints on lint covered with guttapercha tissue and flannel bandage.

Methyl Salicylate Plasters (machine spread) are prepared of size 5 inches by 7 inches, and are useful in lumbago, sciatica, and rheumatism.

Ethyl Salicylate. $C_6H_4.OH.COOC_2H_5=166{\cdot}125$.

A colourless liquid with aromatic odour. Soluble in alcohol. Injected subcutaneously or intravenously. Not nearly so toxic as methyl salicylate. Stated not to be absorbed into the system either by inhalation or when applied to the skin.—Am. Jl. Ph., 1905,331.

Can be used as a substitute for Methyl Salicylate. The substitution of the Ethyl for the Methyl group should make little difference for absorption. It has specific gravity 1·13. Boiling point 225 to 234°.—P.R., Dec. 1915.

Salicyl Salicylate. *Syn.* ✱ **Diplosal** (T.M. 303704.)
$OH.C_6H_4.COO.C_6H_4.COOH.=258{\cdot}1$.

Dose.—15 grains (**1 Gm.**) in cachet or tablets.

Salol in which the phenyl group is replaced by Salicylic Acid. White odourless needles melting at 147° C. Insoluble in water and dilute acids, soluble in alcohol. Used for rheumatism, neuralgia, and cystitis.

Pharmacological experiments showed that the compound remained unchanged for 6 hours in the gastric juice, but was decomposed in 2 or 3 minutes in the duodenal secretion. Hence it does not cause gastric disturbances in therapeutic doses.—M. 1913.

Granular Effervescent Salicylic Acid contains 5 grains in 60 grains. *Dose.*—1 drachm (**4 Gm.**).

Liquor Acidi Salicylici.

Boiling Distilled Water 1,000 parts, Salicylic Acid 1½ parts. Useful in preparing solutions of alkaloidal salts, and may be employed as an antiseptic solvent for other salts ; it is irritating to the eyes.

The late Prof. A. Gamgee strongly recommended this solution as an **Antiseptic Gargle.**

Guttæ Acidi Salicylici Compositæ, St. M.'s H. Salicylic Acid 10 grains, Boric Acid 20 grains, Glycerin 2 drachms, Methylated Spirit to 1 ounce.

Pasta Acidi Salicylici. 1 in Glycerin 9.

Pulvis Salicylicus cum Talco.

Salicylic Acid 3, Wheat Starch 10, Talc 87.

Mix to form a fine powder. For perspiration of the feet.

Ⓟ **Salicylic Cream.**

Salicylic Acid, in powder, 2, Carbolic Acid 1, Glycerin 10; mix. G.H. had Salicylic Acid 1, Glycerin 9.

Used as pigment when the skin is irritated by the discharge from wounds, &c., under antiseptic dressings.

Oleum Acidi Salicylici.

Scabs in eczema are well treated by Salicylic Acid dissolved in Castor Oil.—We suggest 1 in 50. This dissolves on warming.

Unguentum Acidi Salicylici (*Off.*).

Salicylic Acid, in powder 1, White Paraffin Ointment 49. Useful in eczema, acne, ringworm and cancer.

In seborrhœa, the following is useful: Salicylic Acid 1, Precipitated Sulphur 2·5, Cold Cream 25.

Unguentum Acidi Salicylici Compositum. *Syn.* WHITFIELD'S OINTMENT.

Salicylic Acid 1, Benzoic Acid 1, Cocoa Nut Oil 12, Soft Paraffin 16. For ringworm.—L. i./17,222.

Salicylic Gauze, Lint and Wool, each 4%.

Dissolve the Salicylic Acid in alcohol, *q.s.* (about 1=1 of dressing) and impregnate under pressure; dry.

Ammonii Salicylas U.S. $C_6H_4.OH.COO.NH_4=155{\cdot}117$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). U.S.—*Average*, 8 grains.

In crystalline powder, very soluble in water.

Effervescent Ammonium Salicylate.

Dose.—1 drachm (containing 10 grains) or more.

Ferri Salicylas. *Syn.* FERRIC SALICYLATE. Composition varies.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Brownish powder, sparingly soluble in water, but readily in Solution of Potassium Bicarbonate.

In tonsillitis as an antiarthritic tonic and as a dusting powder for foul wounds. Useful in erysipelas and acute tonsillitis in solution formed by interaction of 7½ grains each of Sodium Salicylate and Potassium Bicarbonate and 7½ minims of Ferric Chloride Solution B.P. with diluent *q.s.*—M.C.S. Lawrence, Pr. March '13,633.

Mistura Ferri Salicylata. P.N.F. (not in N.F. IV.) COHEN'S SALICYLATED IRON MIXTURE.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) increased.

Dissolve citric acid 14 in distilled water 200, add Ammonium carbonate 6·5, then dissolve sodium salicylate 125 in this solution; add tincture of ferric chloride, 125, glycerin 175, and oil of betula 4, and then add sufficient distilled water to make 1,000, and filter.

Do the Salicylates and kindred drugs stimulate or exhaust thyroid activity or do they actually neutralise it?—L. ii./11,756, 780.

Magnesii Salicylas. $(C_6H_4.OH.COO)_2Mg, 4H_2O=370{\cdot}534$.

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Colourless crystals. ***Soluble*** 1 in 6 of water. Incompatible with acids and Sodium Bicarbonate. It has been given in typhoid

In flatulence 15 to 45 grains thrice daily useful.—M.A. 1911,318

Potassii Salicylas. $C_6H_4.OH.COOK=176{\cdot}175$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). A white crystalline powder, very soluble in water.

In cyclitis 15 to 20 grains of Salicylic Acid with an equal amount of Potassium Bicarbonate. Speedy relief, pains in the eyes, joints and limbs ceased, followed by a rapid absorption of the vitreous opacities. Pilocarpine injections not so useful. Inflammation of the uveal tract may be caused by the same microbes or toxins which cause specific fevers.—Oph. March, 1911, 183.

Sodii Salicylas (*Off.*). $C_6H_4.OH.COONa=160{\cdot}075$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) in a mixture or in cachets. 5 of salt=4 of acid. Fr.Cx. —*Max. single dose,* 30 grains. Max. during 24 hours 180 grains approximately.

A dose of 40 grains.—B.M.J. i./07,1121.

In white scales or shining tabular crystals (of sweetish taste). For varieties in commerce, compare Salicylic Acid.

Soluble in water 1 in 1. Concentrated solutions should be made with hot water and filtered. In alcohol 90% 1 in 6 by experiment.—W. H. M.

Discoloration of Sodium Salicylate solutions due to ammonia avoided by floating a basin containing a pad of cotton wool soaked in a little Acetic Acid on the surface.—W. Macadie, P.J. i./15,355. See also Prof. Greenish, *ibid* 201.

Incompatible with free ammonia, ammonium carbonate, and aromatic spirit of ammonia (turns brown). Mineral and many organic acids cause separation of salicylic acid, *e.g.*, to dispense Sodium Salicylate with Tincture of Perchloride of Iron, dissolve 1 drachm of the salt in 2 ounces of Water, add 30 to 40 minims of the Tincture and 1½ ounces of a solution of Potassium Bicarbonate 1 drachm in 1 ounce, then Chloroform Water to 8 ounces. The result is a clear palatable claret colored mixture useful in rheumatic sore throats combined with anæmia.—L. i./11,1207.

Flavoring.—Syl Lavandulæ, Glyl Pini ; Syrupus Aromaticus (not so good as the former). Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Germicidal Action. Almost nil. For effect as antirheumatic *vide* abstract *infra.*—R. Stockman, B.M.J. i./13,598. *For our experimental work see Vol. II.*

Uses.—Rheumatism, neuralgia, possibly diarrhœa, vertigo, Menière's disease, malarial fevers and diabetes may all be well treated by salicylates. In influenza and acute tonsillitis, 10 grains every three hours relieve the distressing symptoms. Its solution forms an antiseptic wash for the bladder, but as a urinary antiseptic (*per os*) it has less action than Hexamine,—about 50% of that given is excreted as Salicyluric Acid.

One of the best intestinal antiseptics.—L. i./09,446.

In influenza, combined with Tincture of Nux Vomica, after Mercurial purge,—highly beneficial.—Pr. March, 1911.

Diarrhœa (of young children—almost specific), puerperal fever, biliousness, acute pains of fibrositis, nephritis, cystitis, urticaria and Graves' disease well treated. By some it is considered the most powerful of hepatic stimulants,.—Pr. March, 1911.

A dose of Sodium Salicylate circulates unchanged in the blood, or in combinations in which its properties are unimpaired. It is rapidly excreted into the bladder, and *via* the intestines as well as by the sweat, bile and saliva partly unaltered, partly as free salicylic acid and partly in combination.—Pr. March, '11 ; P.J. ii./11,16.

In sciatica the electro-negative salicyl ions may be driven into the tissues.—L. ii./08,1299, 1314, *vide* Iontophoresis, *Vol. II.*

Acute rheumatism, large doses, *e.g.*, 150 grains daily, with twice the amount of Sodium Bicarbonate. The latter should always accompany it to render urine alkaline and to prevent constipation. —B.M.J. ii./08,1812 ; L. ii./08,1816 ; B.M.J. i./09,147.

In rheumatism Stockman has shown that the fall of temperature under treatment with Salicylate and return of joints to the normal, vary within limits with the dose administered.—Pr., Feb. 09,249.

Acute rheumatism well treated by rectal injections of 8 Gm. in 150 Cc. with 1·5 Cc. Opium Tincture.—M.P.C. Oct, 1914, p. 371.

The COOH grouping *on* the Benzene ring in conjunction with the OH in the ortho- position seem to place Salicylic Acid at the highest point of efficacy of all anti-rheumatics ; with 2COOH introduced as in Phthalic Acid efficacy vanishes. The Cresotinic Acids are the only bodies at all approaching Salicylic Acid in utility. It is not known definitely whether the Salicylates act as antitoxins or as antimicrobics. What is wanted is a remedy that will abolish or lessen the chances of injury to the muscles and valves of the heart in treatment of severe rheumatic affections. In acute rheumatism 90 to 160 grains or more in 24 hours act when infection is recent and when the inflammation is confined to joints, but when fibrous tissues of the heart valves or of the muscles *or* body generally are deeply implicated a more potent remedy is wanted.—R. Stockman, B.M.J. i./13,598.

Salicylates not specific in every form of affection called rheumatic. The pyrexia of acute polyarticular rheumatism was generally controlled within three days, but in the rheumatic state there was often a pyrexia ranging through two degrees, which continued even for weeks and was unaccompanied by any obvious manifestation of rheumatism. Such pyrexia was often uninfluenced by the Salicylates, though it might yield to Salol or Aspirin. The employment of the Salicylates in rheumatic hyperpyrexia was waste of valuable time. The cutaneous manifestations of rheumatism were uninfluenced. Neither the various forms of erythema purpura nor erythema nodosum appeared to be influenced and these manifestations had occurred while patients were actually taking the drug. The subcutaneous nodules, described by Barlow and Warner, were undoubtedly rheumatic in nature, but they were quite uninfluenced by the administration of the Salicylates. The similarity of their structure to that of the inflamed valves of the heart in rheumatism was a powerful argument against the utility of the employment of Salicylates in endocarditis or pericarditis. The danger of upsetting the stomach with the irritant Salicylates must be borne in mind in the treatment of all heart affections, as also must the risk of acidosis.—B.M.J. i./11,1177 ; L. i./11,1277.

The pain of acute rheumatic arthritis should yield in 24 hours with 10 grains and 20 grains of Bicarbonate of Soda every two hours for three doses, and then every four hours.—L. i./11,1277. Pr. Jan. 1912, 91.

Rheumatic pericarditis requires large and increasing doses. That this drug is a cardiac depressant and hence to be avoided in pericarditis is a pernicious error. Large doses of this, up to 600 grains daily with 1200 of Sodium Bicarbonate successfully used.—D. B. Lees, P.R.S.M. Med. Sec., Mar. 1910, p. 71.

Early cardiac complications of rheumatism, Sodium Salicylate, with Sodium Bicarbonate in the proportion of 1 to 2 most effective—dose to be gradually increased The Sodium Bicarbonate probably counteracts the acid toxins (Formic Acid and probably also Acetic, according to Walker & Ryffel). 60 grains 10 times daily of Salicylate were given to a boy of 16 who had an enormous crop of rheumatic nodules, about 250 in all, with pericarditis, endocarditis, dilated heart and moderate arthritis. The maximum amount of 600 grains of Salicylate with 1,200 grains of Bicarbonate was given for two days. After this 500 grains Salicylate with 1,000 of Bicarbonate for 6 days a week for 3 weeks—the amount then gradually reduced. Every nodule disappeared, pericardial friction vanished and heart became smaller. Left hospital with merely a short presystolic and short systolic murmur at the apex. Prevent constipation and keep urine slightly alkaline.—D. Lees, B.M.J. ii./12,930

Hæmorrhage and mucus from the bowel (apparently connected with a past rheumatic fever) was instantly relieved by large doses.—B.M.J. ii./08,1773

In gonorrhœa, especially acute posterior urethritis.—Pr. Apl./09,544.

General peritonitis, as patient was of rheumatic tendency, 20 grains given on chance. Cure.—B.M.J. ii./08,1602.

The itching of pruritus ani may be instantly relieved by the application of a very minute quantity of Sodium Salicylate.—L ii./11,123.

Sedative anæsthetic action on the mucous membrane of the mouth, the pharynx and the gums—Pledgets of cotton wool soaked in sodium salicylate solution allay pain if applied to the cavity on extracting a tooth. A 4% solution is useful if applied to chapped hands, local defects of epidermis, sore nipples, and ulcerated chilblains.—Sem. Med. July 13/10, per M.A. 1911.

In typhoid suggested to give 3 to 5 grains in intestinal capsules. 0·25% inhibited growth of *B. Typhosus*.—L. ii./12,439.

Chorea believed to be always rheumatic, at least in part, therefore give Sodium Salicylate lest fresh rheumatic manifestations develop, which might thus be avoided. Smaller doses advocated than those of D. B. Lees with Sodium Bicarbonate in double amount of the Salicylate. Before starting treatment bowels should be freely opened, and before increasing dose evacuation should have taken place during preceding 12 hours. Chloretone as sedative sometimes useful in 3 to 5 grain doses.—F. Langmead, B.M.J. i./13,1262; L. ii./13,1755.

R. Stockman does not believe in the Salicylic treatment of chorea, but prefers Arsenic and nerve sedatives.—Pr. Jan. 1912.

Toxicity of Salicylates. Mean toxic dose for males of the synthetic Sodium Salicylate was 180 grains, for females 140 grains, of the natural Salt 200 and 135 grains respectively; of Methyl Salicylate 120 minims alike for males and females, of Aspirin 165 and 120 grains respectively. The doses in arriving at these figures were given until symptoms of intoxication appeared.—P. J. Hanzlik, L. i./13,1811; Jl. A.M.A. March 29, 1913.

Salicylate treatment controls bacterial activity. Dose required usually 60 to 120 grains *p.d.* It should be given with this sole view—distinguish between symptoms directly due to and those depending on toxic parenchymatous changes which may remain long after bacterial activity has ceased.—R. Miller, L.i./15,175.

Excretion of Salicylic Acid. About 20 Cc. of a 10% Sodium Salicylate solution given hourly until toxic symptoms appeared—*i.e.*, after an average of 13·8 Gm. of Salicylic Acid had been taken. Fluid was then taken regularly until salicylic acid disappeared from the urine. The total excretion (60%) in acute rheumatism was about 15% less than in normal persons (75%).—B.M.J. ii./17,296.

As an anti-diarrhœic, has been used in the war. Men going within the hearing of big guns for the first time received 15 grain doses, preventing the otherwise involuntary motion.

Trench foot has been relieved by, *c.f.* Therap. Index.

Tablets, 3 and 5 grains (**0·2 and 0·3 Gm.**).

Effervescent Sodium Salicylate. This is made in two strengths—5 and 10 grains in a drachm. *Dose.*—1 drachm (**4 Gm.**) or more.

✱ **'Vescettes' of Sodium Salicylate.** 5 grains. To be crushed and taken in a draught of warm water.

Nascent Sodium Salicylate Tablets contain Salicylic Acid equivalent to 5 grains of Sodium Salicylate plus an excess of Sodium Bicarbonate. Dissolve easily in water. In this form the irritating symptoms of the Salicylate are said to be reduced to a minimum.—Lambert, Jl. A.M.A. per Pres. 1911, 296.

Injectio Sodii Salicylatis. *Dose.*—15 to 30 minims (**1 to 2 Cc.**). 1 in 20 of sterile water or weaker. Is injected at the seat of the pain in rheumatism. Intravenously 4 grains have given relief.

Mistura Sodii Salicylatis.

Dose.—1 ounce (**30 Cc.**).

Sodium Salicylate 10 grains, Aromatic Spirit of Ammonia ½ drachm, Belladonna Tincture 5 minims, Chloroform Water to 1 ounce. For a common cold every four hours.—Pr. Mar. 1911.

Acidum Acetyl-Salicylicum (*Off.*). Fr. Cx. P.G.V. P. Helv., P. Dan, Ph. Ital. $CH_3CO.O.C_6H_4COOH = 180·109$.

Aspirin.—Trade Marks No. 221673, registered in 1899 and No. 322523, registered in 1914 by an Associated Ltd. Company in this country. Both these marks were removed from the Register ('avoided') in 1915 under the provisions of the Patents, Designs and Trade Marks (Temporary Rules) Act, 1914. (See C. & D., Jan. 2, and Feb. 20, 1915, P.J. i./15,27,88).

The Name Aspirin is now *public property.*

The American Patent Office followed suit and held that the U.S.A. Trade Mark No. 32805/1899 is not a valid trade mark, and recommendation was made that it be cancelled.—C. & D., Feb. 1, 1919.

The following Associated Trade Marks are still on the British Register:—✱Novaspirin, 284656, 322552; ✱Aspirinoids, 284821, 322524; ✱Novaspirinoids, 298891, 322553; ✱Diaspirin, 301139, 322531.

Patents.—No. 27088 of 1898, "Manufacture or Production of Acetyl-Salicylic Acid," and No. 9123 of 1899. The first of these was declared invalid in 1905 (see C. & D., July 15, 1905, p. 81), the second one became void in the eighth year. The German patent is 93110 (14/6/96). "Verfahren zur Darstellung von Salicylessigsaure" and was granted to Dr. Ludwig Limpach, Berlin. The second British patent deals with the use of condensing agents during the reaction. *See also Manufacture*, p. 87.

Riedel's method, Patent No. 11596/97, which became void in the seventh year "Process for the manufacture of Salicylic-acetic Acid," is of importance. It consists in causing **monochloracetates** to act on salts of salicylic nitril or salicylamide and saponifying the product.

Acetosal, **Acetysal**, ✱ **Empirin** (T.M. 364114), ✱**Genasprin** (T.M. 380162), **Helicon**, **Salacetin**, ✱ **Salaspin** (T.M. 363715), and **Saletin**, are further names for the substance.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**), in cachets or suspended in a good draught of water thrice daily after meals—never on an empty stomach. Children ½ to 5 grains (**0·03 to 0·3 Gm.**).

Manufacture.—By action of acetic anhydride on Salicylic Acid. Salicylic Acid 50 and Acetic Anhydride 75 are heated to 150° C. for two hours under a reflux condenser. On cooling the crystals are pressed out and recrystallised from dry Chloroform. Alternatively Salicylic Acid 25 and Acetyl Chloride 20 are heated under a reflux condenser to 80° C. for some hours. Excess of Acetyl Chloride is removed on the water bath and the product recrystallised from dry Chloroform, Benzene or Carbon Tetrachloride.—P.J. ii./15,489,490. *Vide also Patents*, p. 86..

Characters.—A white powder M.pt. 133 to 135° C. Parry thinks the true M.pt. is nearer 136 –137°. There is good reason for believing that it is not an absolutely stable body—all samples have a more or less marked odor of Acetic Acid. ***Soluble*** about 1 in 400 of water. 1 in 5 alcohol 90%. Incomplete solubility is caused sometimes by the use of benzene as recrystallising medium.—Prof. H. Llewellyn Smith.—P.J. i./15,200.

Aspirin passes (in great measure) unchanged through the stomach decomposing to a great extent on reaching the alkaline intestinal juices (see work of Stockman, *infra*). ***Incompatible*** with free acids, iron salts and alkalis. It forms a clear mixture with Sodium Bicarbonate, owing to formation of Acetate and Salicylate of Sodium, and is not intended to be thus prescribed. Heating the acid in presence of moisture also causes dissociation.

Ferric Chloride added to Solution produces no violet colour; distinction from and absence of Salicylic Acid. For further details see Vol. II.

Flavoring.—Glyl Aurantii Amari, Glyl Vanillæ, Glyl Menthæ Piperitæ; Syrupus Pruni Virginianæ, Syrupus Tolutanus.

Uses.—Has anti-rheumatic properties, and is used as a substitute for Salicylic Acid and its salts. Does not irritate the mucous membrane of the stomach, and is to be preferred in heart and ear complaints. Is useful in influenza (especially with Quinine), acute and chronic affections of the joints, and in gout, neuralgia, chorea, and pleurisy. Has been used in hay-fever, diabetes and dysmenorrhœa. The gradual hydrolysis of the substance in the body is said to prevent the cumulative toxic action of the Salicylic Acid. It relieves the pain of cancer and of cystitis.

In some cases of influenza, it is useful with Caffeine, *e.g.*, Aceto-Salicylic Acid 7½ grains with Caffeine 3 grains.

Physiological Action.—Our experiments have shewn that in passing through the stomach Acetyl-Salicylic Acid splits up to an extent not exceeding 5% of the amount taken, the bulk of the acid being absorbed as salicylate in the intestines after hydrolysis.

Prof. H. Llewellyn Smith has gone over similar ground with numerous commercial samples and confirms our results.—P.J. i./15,200.

For *further details, also for* ***Bactericidal Action*** *vide* Vol. II.

Mistura Acidi Acetyl-Salicylici.—*Dose*—½ ounce = 10 grains. Acetyl Salicylic Acid in fine powder 10 grains, Tragacanth Mucilage 90 minims, Water to ½ ounce.

If it be desired to prescribe the acid in a mixture the above formula will serve, providing it is not kept too long, particularly in hot weather.

Tablets are prepared weighing 5 grains (0·3 Gm.), and 8 grains (0·5 Gm.). These should *not be swallowed whole.*

Also **Tablets of Acetyl-Salicylic Acid with Phenacetin** 2½ grains each and **with Dover Powder** 2½ grains.

Tablets made with 1½ molecules of Sodium Bicarbonate to 1 molecule of Acid subject of a Patent.—P.J. i /13,768

Elixir Sodii Brom-Acetosalicylatis.

Dose—½ ounce repeated each hour if necessary until 4 doses have been taken. Contains the equivalent of 10 grains of Acetyl-Salicylic Acid and 10 grains of Sodium Bromide in 1 ounce.

Antipyretic. Relieves chronic articular rheumatism, also muscular rheumatic pains and may be tried for vague neuralgic pain.—W. W. W.

References to Acetyl-Salicylic Acid.

Acetyl-Salicylic Acid, Patent Case, P.J i./05,672,700.—Judgment P.J ii /05,76, see also P.J. ii./07,424.

Useful in cases of severe headache due to overwork, in which 10 grains at bedtime cause perspiration and relief of pain and refreshing sleep afterwards —L. i./05,84.

For prevention of coryza combined with Quinine.—B.M.J. ii./08,1052.

Arthritis deformans treated.—L. ii./08,1814

In diabetes in the tropics, with Antipyrine, in 5 grain doses of each materially reduces the number of night calls for micturition and relieves thirst and burning.—B.M.J. ii./07,1054.

Chorea in a girl of 16 treated with 5 grains increased to 10 grains with recovery.—L. ii./03,526. B.M.J. ii./09,794.

In erythema nodosum and rheumatism 15 grains twice daily. Good result. —L. i./07,207.

Sciatica well treated by 15 grain doses *ter in die.*—L. ii./08,1299.

10 grains four times daily keeps patient in a continuous sweat during which quiet sleep supervenes, fever is reduced, and pulse improves—complications when present usually mild. Course of the fever appears to be shortened —Pres. May, 1910, p. 88

In dengue Aceto-Salicylic Acid 7½ grains thrice daily has been used.—Brooke.

Chorea,—the drug par excellence. Large doses (10 grains) four hourly to a child of six. Best given suspended and flavoured, *e.g.*, Acetyl-Salicylic Acid 10, Gum Acacia *q.s.*, Syrup of Orange 30, Chloroform Water to 120. A dessertspoonful dose = 10 grains.—J. Allan, Pres. Feb. 1913,51

Pneumonia in Southern India. Good results in eight cases—not of a rheumatic origin as acute rheumatism is unknown in the locality. Early stages 8 to 10 grain doses of Aspirin given. Respirations and pulse fell satisfactorily after crisis in each case.—L. i./13,786.

Acute Nasal Catarrh, prophylaxis of—Aspirin in 20 grain doses three times a day. Magical in the acute attacks.—B.M.J. ii./13,836.

Extensive syphilitic periostitis,—to relieve. Large doses of Acetyl-Salicylic Acid—3 to 4 Gm. p.d. for nine years—making a total of over 26 lbs. No by-effects providing bowels opened freely. On an empty stomach there was often pain—probably from the enhancing of the acidity. No ill effect even when combined with Mercury, Salvarsan, etc.—P.J. i./13,150.

Glycosuria is occasionally reduced by.—W. Hale White, L. i./14,372.

When aspirin is placed dry on the tongue and washed down with water there is a slight feeling of local anæsthesia on the tongue, which we have attributed to nascent salicylic and acetic acids, the aspirin being immediately hydrolysed by moisture, and being ionic the acids are much more active Some cases of gastric pain are immediately relieved by small doses of aspirin, and this relief may be due to the nascent aromatic acid.—C. & D., March 25, 1911.

Occasionally it is found that the normal acidity of the stomach is absent (a condition not infrequently associated with phthisis), and in such cases it is advised that a little hydrochloric acid or lemon-juice should be taken before the dose to overcome alkalinity in the stomach —C.D. i./11,717

For rheumatic pains in the arm 15 grains in three 5 grain doses during 4 to 5 hours. Within 20 minutes of the third dose marked œdema of the eyelids, forehead and cheeks suddenly developed. The œdema did not disappear until the third day, and rheumatic pain ceased. Another patient experienced similar effect—5 grains caused puffiness of the eyelids.—P H. Abercrombie, B M.J. i./11,1314

Toxic Effects.

May cause gastric pain, vomiting and giddiness; œdema of face and skin rash may occur —L. ii./05,1518.

Poisoning by 10 grain dose with Exalgin 2 grains given in slight rheumatism caused alarming symptoms. Patient thought his last hour had come.—B.M.J. ii./08,1052.

Swelling of the face, especially eyelids, lips and nose, tongue and fauces thought to be a rare idiosyncrasy. A 5 grain tablet taken for rheumatism allowed to dissolve in the mouth and without using liquid to wash it down. —B.M.J. i./11,307.

Note on a toxic effect of Aspirin—two cases—apparently idiosyncrasy.—L. ii./11,761.

Poisoning by Acetyl Salicylic Acid, patient taking the drug should rest afterwards.—B.M.J. ii./11,1456.

Poisoning from 10 grains after a glass of milk. Contrary to general statements, it is said that it should be taken on an *empty* stomach and unaccompanied by anything except water. Powdered Ergot, 1 grain, owing to its antagonistic action, will prevent symptoms of poisoning.—B.M.J. i./13,1108

Cyanosis and rash after 10 grains of Aspirin—special idiosyncrasy.—W. A. E. Karunaratne.—B M.J. ii 19, 42.

Patients with low blood pressure and nasal polypi cannot take Aspirin. Phenacetin is usually safe.—A. Francis, *ibid.* 204; *see* also *ibid.* 560 and 694.

Calcii Aceto-salicylas (Patent). *Syn.* ✱ **Tylcalsin** (T.M. 337714).

Martindale.—$(CH_3CO.O.C_6H_4.COO)_2Ca\ (+2H_2O)=434{\cdot}304$.

✱ **Kalmopyrin** (T.M. 343371) has the same composition.

White amorphous, non-hygroscopic powder, the manufacture of which is protected by several patents, *e.g.*, No. 4986 of 1912.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**). May be dissolved in a little water at the time of taking.

Solubility.—An interesting feature of this salt is its great solubility in water (1 in 6) and comparatively slight solubility (1 in 800) in Alcohol.—W. H. M.

Incompatible with mineral acids and as other Lime Salts.

Serious drawbacks to the use of Acetyl-Salicylic Acid are its incompatibility with Sodium Bicarbonate and that it is insoluble in water and cannot be given in a mixture.—R. Stockman, B.M J. i./13,599.

In the case of Tylcalsin experiments show that with a mixture containing 5% of the compound with 5% of Sodium Bicarbonate incompatibility occurs in that Calcium Carbonate is precipitated with evolution of CO_2, but the Sodium Aceto-Salicylate formed remains as such for a period of at least 2 days, only a small proportion of it (about 6%) is split up—this is in fact no more than occurs with Tylcalsin in water alone.

Tylcalsin, as already indicated, is very soluble in water and can be given in mixture form subject to the above incompatibilities.

It is preferably given as **Tablet** or **Cachet** 8 grains (**0·5 Gm.**) each.

Uses.—In view of its great solubility, Tylcalsin forms a very useful substitute for Aceto-Salicylic Acid. (Compare note under Aceto-Salicylic Acid by Graham Chambers, Vol. II.—from which it is evident that Soluble Medicaments pass rapidly through into the intestine and are there absorbed).

It hydrolyses slightly in Solution—less than the Lithium Salt, but is rapidly split up on boiling in solution.

A prompt remedy as an anti-rheumatic and influenza specific, in catarrhs and neuralgia and for general relief of pain. The response in these affections is excellent. It combines the good qualities both of Sodium Salicylate and Acetyl Salicylic Acid. No by-effects are produced on the heart, etc. It is well tolerated and has never been known to produce vomiting. A useful analgesic, veritably specific, for chronic rheumatic pains of the limbs.

Antipyretic action occurs in about an hour, with drop of temperature of 0·4 to 0·8° C.—the drop being maintained for 2 to 2½ hours, then give further dose—for rheumatic gout pain. As analgesic one tablet is often sufficient, two may be given if heart action normal.

In lumbago 2 Tablets at night in hot tea (as diaphoretic) valuable.

In neuralgia the writer (W. H. M.) had the following results. There had been bad bouts of neuralgia for a week or two consequent on some dental trouble. One day the neuralgia, which stretched from the ear to the chin, became intolerable. Treatment during the day was as follows:—8.30 a.m., Syr. Easton; 9 a.m., Carbolic Lotion as mouthwash; 10 a.m., Lin. A.B.C. all over side of face, Chloral cum Camphora rubbed into gums; 2 p.m., Pil Butyl Chloral cum Gelseminina internally. Little relief all day—the pain at times was intolerable. 10 p.m. took 2 Tylcalsin Tablets. Soothed in half an hour. Pain ceased and permitted literary work until 1 a.m.

In rheumatism associated with gonorrhœa, Tylcalsin has given excellent results.

Calcium Salicylate has been found exceptionally useful in obstinate diarrhœa—hence this new body may have further utility in this direction.

The advantage presented by Tylcalsin and Tyllithin over the acid is of course their far greater solubility favouring rapidity of action.—B.M.J. i./13,1278.

It does not cause pharyngeal or gastric pain like the free acid and it occasions less renal irritation.—P.J i./17,419.

Granular Effervescent Tylcalsin contains 5 grains in the drachm.

Dose.—1 to 3 drachms.

A clinical report says:—A case of septic throat (Staphylo. and Streptococcal by examination) treated with success with Tylcalsin internally and Tinctura Ananassæ locally. In less than 24 hours the symptoms had completely disappeared. Tylcalsin acted well in checking the incubation of the Cocci and reducing temperature rapidly. For a septic throat, had never seen one give way so quickly.—Craik Taylor

Lithii Aceto - Salicylas $CH_3CO.O.C_6H_4COOLi$ = 186·041. *Syn.* ✱ **Tyllithin** (T.M. 337715). ✱ Hydropyrin (T.M. 318592) is a similar compound.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**). Maximum daily dose 75 grains (**5 Gm.**).

White powder with bitter taste. *Soluble* 1 in 1 (by experiment) in Water, 1 in 4 Alcohol (W. H. M.), insoluble in Ether. The salt is to be kept in a well closed bottle as it is slightly hygroscopic and undergoes decomposition in moist air. Its manufacture is protected by several patents.

Uses.—Analogous to those of the Calcium Salt above described. The Lithium body may be preferred by some practitioners but the effects of treatment are practically identical.

Hydrolysis of Tylcalsin and Tyllithin.—Experiments which we conducted in 1911—the outlines of which are given in Vol. II., showed that the amount of splitting up in the presence of Hydrochloric Acid of physiological strength, is practically identical in the case of the Calcium and Lithium Salts and the parent Acetyl-Salicylic Acid—amounting in fact to between 2 and 5% of the dose taken in 4½ hours. Hence the alkaline salts may be quite as useful in physiological action as the acid, and by reason of their greater solubility—in particular the Calcium Salt—should possess distinct advantage for prompt action.

Incompatible with Iron Salts, Mineral Acids and Alkalies.

R. Stockman draws attention to the fact that Acetyl-Salicylic Acid is incompatible with Sodium Bicarbonate, is insoluble in water, and cannot be given in a mixture.—B.M.J. i./13,599.

These difficulties are in great measure overcome with Tyllithin.

Experiments show that with a mixture of 5% each Tyllithin and Sodium Bicarbonate a very slight precipitate of Lithium compound forms with evolution of CO_2—Sodium Aceto-Salicylate being formed in solution. The Aceto-Salicylate radical remains undecomposed except to the extent of about 6·5% of it, which occurs in two days time. This is not more than in the case of Tyllithin alone in solution.

It is preferably given as **Tyllithin Tablets**, 8 grains (**0·5 Gm.**) in each.

Granular Effervescent Tyllithin contains 5 grains in the drachm.

Dose.—1 to 3 drachms.

Tylcalsin 5 grains, Quinine Salicylate 1 grain, Salol 5 grains, and Phenalgin 10 grains, as a combined powder, has been found most efficient in neuritis and neuralgia.

Magnesii Aceto-Salicylas. *Syn.* **Magisal.** *Martindale.*

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

Made by stirring the acid for a considerable time in a little water with Magnesium Oxide, Magnesium Hydroxide or Magnesium Carbonate, *e.g.*, Magnesium Oxide 40, Aceto-salicylic Acid 360, Water 180. When the reaction is complete the mixture is extracted with Alcohol and the Alcoholic solution precipitated with Ether.—(G. Richter, Patent No. 10,946 of 1914.)

Or by shaking the last mentioned quantities with ten times the amount of water stated, then adding Methyl Alcohol and precipitating the salt with Ether.

We have worked on this chemical and find it better to use Alcohol (90%) 1600 for above quantities without the use of any water, and to precipitate with Ether 6000 after filtering. If made this way the content of Salicylic Acid as impurity is only 0·2%, whilst with the water method it may exceed 3%.

Microcrystalline powder, non-hygroscopic, almost tasteless and odourless, soluble readily in water and in Methyl Alcohol, less in spirit.—P. ii./15,436; i./17,419.

Uses.—This is an interesting relatively stable Acetosalicylate which may be tried as an alternative to the other salts and the acid.

Saligenin.—$C_6H_4CH_2OH.OH = 124·099$.

Dose.—10 grains (**0·6 Gm.**).

Chemically this is the Alcohol of which Salicylic Acid is the corresponding acid. It is converted into the acid in the body.

In acute rheumatism it is well spoken of by R. Stockman,—the above dose every two hours. Action rapid. Pain in joints ceased in 12 hours and temperature normal in 36 hours. In another case the fibrous tissue was widely affected and 1,340 grains had to be given. It caused a good deal of perspiration, and two cases suffered from deafness.—B.M.J. i./13,598.

Phenyl-Acetyl Salicylate. *Syn.* VESIPYRINE, ACETYL-SALOL.

$C_6H_4.O.CH_3CO.COO.\ C_6H_5 = 256·171$.

Dose.—15 grains (**1 Gm.**) thrice daily. Much larger doses have been given. Crystals insoluble in water. Soluble in alcohol. Uses as for salol and salicylates. Breaks up in the intestine into salol and acetic acid.—F.N., 1909.

Mono-salicylic-glycerin-ester. *Syn.* GLYCOSAL.

$C_6H_4.OH.COO.C_3H_5(OH)_2 = 212·146$.

Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).

A white crystalline powder only slightly soluble in water, but soluble 1 in 3 of 90% alcohol and in glycerin.

As urinary antiseptic. Ointment 10 or 20% in eczema. 20% Collodion for sciatica, and alcoholic Solution for rheumatic joints. Does not contain enough Salicylic Acid to make it a remedy in rheumatic fever.—R. Stockman B.M.J. i./13,599.

Acetyl methyl-Salicylate. *Syn.* SALACETOL.

$C_6H_4(OH).COO.CH_2CO.CH_3 = 194·13$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) in cachets or suspended

Manufacture.—By heating Sodium Salicylate with Monochlor-Acetone in equimolecular proportions, in shining crystals very slightly soluble in water in alcohol 90% 1 in 14 easily. Caustic alkalis decompose it forming salicylates.

Used in rheumatism. For diarrhœa best given in Castor Oil (if required)—before breakfast.

Salicinum. (*Off.*), U.S. $C_6H_{11}O_5.O.C_6H_4.CH_2OH = 286·209$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in aqueous solution, taste may be covered with liquid extract of liquorice, or small dose in pill with glycerin of tragacanth.

A glucoside in colourless shining trimetric tabular crystals, without odour, taste moderately bitter. ***Soluble*** 1 in 28 parts of cold water, less in alcohol, but not soluble in ether. Obtained commercially from *Salix fragilis* or *S. purpurea* and other species of willow. M.pt. 200° C.

Flavoring.—Syl Rosæ, Glyl Cinnamomi; Syrupus Aurantii, Elixir Saccharini.

Uses.—In small doses, often combined with valerianates and compound rhubarb pill, is a mild tonic. It is stated to cure influenza more rapidly than any other treatment, and to act as a prophylactic. In acute rheumatism, large doses are specific. Is used for all malarial fevers. Is of value in psoriasis and in syphilis where Mercury is not tolerated. It is not adapted for use as an external antiseptic.

Effervescent Salicin.

Dose.—1 drachm. Contains 5 grains in 1 drachm.

Tablets, 5 grains of Salicin (**0·3 Gm.**). *Dose.*—1 to 4.

Ten grains of salicin in draught with carbonate of ammonium checks pyrexia of phthisis.—B.M.J. i./91,684.

Its action depends on production of Salicylic Acid in the blood. In rheumatic fever it is highly satisfactory. 20 grain doses hourly or 30 grains every 2 or 3 hours. 60 grains have been given repeated in 2 hours without ill effect.—R. Stockman, B.M.J. i./13,598.

In lupus erythematosus with good results, 15 grains 3 times a day with a saline aperient.—J. M. H. MacLeod, B.M.J. ii./13,313.

Influenza. Salicin, large doses effectual; 20 grains every hour for 12 hours followed by 20 grains every 2 hours for the next 12; also removes infectivity of patient.—E. B. Turner, B.M.J. ii./18, 112; i./19,278.

Salol (*Off.*). **Phenyl Salicylate** $C_6H_4.OH.COO.C_6H_5=214{\cdot}145$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachets or suspended in milk. Fr. Cx.: *Max. single dose*, 15 grains. Max. during 24 hours, 90 grains.

Small crystals, with a slight wintergreen odour.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 3. **Pills** contain 2½ grains. **Capsules** contain 5 and 10 grains (**0·3 and 0·6 Gm.**).

Soluble 1 in 10 or more of alcohol, 1 in 12 of liquid paraffin, in fixed oils, and a trace in glycerin. Almost insoluble in water.

Dispensing Note.—When prescribed in an emulsion with an oil, *e.g.* Castor Oil, dissolve it in the oil before proceeding. Melt the Salol and the oil in a warmed mortar (salol melts about 42 to 43° C.); emulsify with tragacanth, using hot water to complete.

Flavoring.—Glyl Lavandulæ, Glyl Pini; Elixir Aromaticus, Syrupus Aurantii Floris.

Uses.—Antiseptic and antipyretic. In the small intestine it splits up into its component parts, both being found in the urine, which is rendered aseptic and becomes very dark. With success for rheumatism, acute and chronic, for sciatica, dysentery, and typhoid fever, gonorrhœa and vesical catarrh and diabetes. The dose is limited by its *phenol* content.—R. Stockman, B.M.J. i./13,599.

In all forms of sore throat, relieves earache and ocular neuralgia, and of value for summer diarrhœa, especially of children. Must not be given in renal disease.

In diagnosis of fermentative Indigestion:—

The time taken for the food to leave the stomach may be found by giving 15 grains of Salol. This does not undergo decomposition in acid, but in an alkaline medium is split up into constituents, phenol and salicylic acid. The presence of the latter is readily found in the urine by adding a little neutral Ferric Chloride solution. One may expect to find it normally in from 45 *to 75 minutes after Salol is taken.*—B.M.J. i./11,665.

Cachets of Salol, Bismuth Carbonate and **Sodium Bicarbonate,** 5 grains each are useful as intestinal antiseptic.

Salol Mouth Wash.

A preparation similar to Odol; is produced by dissolving Salol 2·5, Saccharin 0·004, Peppermint Oil 0·5, in Alcohol 80%, 97 by weight, and adding Clove and Caraway Oil.—Y.B.P. 1902,284. *For use* dilute in proportion ½ to 1 teaspoonful to the ½ pint of warm water.

Emulsio Salol. *Dose.*—½ to 1 ounce.

Salol 20 grains, Compound Tragacanth Powder 20 grains, Distilled Water *q.s.* to 1 ounce.

In the treatment of cholera during the algide stage the following mixtures have been used:—Salol 10 grains, Mucilage 1 drachm, Spirit of Chloroform 15 minims, Water 1 ounce—every 2 hours until reaction sets in—then Sodium Bicarbonate 10 grains, Spirit of Chloroform 20 minims, Sweet Spirits of Nitre 20 minims, Water to 2 drachms, every four hours till urinary secretion is established and normal. Cox combines with this 2 or 3 quart intravenous injections of warm Sodium Chloride Solution (100 grains to the quart). This injection is made by gravity (2 or 3 feet head of water), and may be repeated. —Brooke.

Salol in dusting powders, tooth powders, lotions, pomades, etc., is held by some to possibly produce eczematous skin eruptions. Small particles of Salol, *e.g.*, in a tooth powder may be more irritant than a solution would be —P.R. Oct. 1913; P.J. ii./13,602

Salol Coating of Pills is conducted by employing Salol *melted.*

This renders the pill insoluble in the acid gastric juice, but soluble in the alkaline fluid of the intestine; hence suitable for purgatives to act on the bowels, and for administering antiseptic remedies in cases of eczema and urticaria, when these are caused by intoxication from ptomaines in the intestinal canal. *c.f.* Our experiments under **Pilulæ.**

Collodium Salol. Salol 4, Ether 4, Collodion 30. Gives rapid relief in pain of acute rheumatism.

Salol Catheter Oil. Salol 1, Castor Oil and Almond Oil, of each 15. Does not dissolve the varnish of catheters (G. Buckston Browne).

Salol cum Camphora, Salol Camphor.

Salol 3, Camphor 2, heated together combine to form a viscid liquid, which has been used as an antiseptic in place of iodoform. Prepared with 10% only of camphor, quickly crystallizes, and when powdered is suitable for application, where liquid not practicable.

Useful in suppuration of the middle ear; non-irritating.

Liquefaction of mixtures of salol with other substances.—Am Jl. Ph. May, 1910, 241.

P1 Unguentum Salol cum Cocaina.

Salol 2, Cocaine Hydrochloride 1, Ceratum Petrolei 16. Useful for burns.

Unguentum Salol cum Menthol.
Salol 4, Menthol 2, Olive Oil 4, Anhydrous Lanolin to 100. For fissures of the skin, *e.g.*, in chapped hands.—Pres. 1913,260. Slightly modified.

Acetyl-para-amido-Salol. ✱ **Salophen.** P. BELG., HELV., SVEC
C_6H_4 OH.COO.C_6H_4NH.$COCH_3$=271·189.
TRADE MARKS 278592 and 322560.
PATENT 11,833/1891 and 3435/1892, both now lapsed.

According to the first patent Nitrophenyl Salicylate (Nitro-Salol) (*c.f* German Patent 43,713/1887) is reduced with Tin and Hydrochloric Acid. The Amido compound is then acetylated with Acetyl Chloride or Acetic Anhydride. The second patent starts with Acetyl-*p*-Amidophenol (Berichte XI. p. 232).

The use of tin in our experience for reduction is bad—it is difficult to remove, and the use of Hydrogen Sulphide is unsatisfactory in general. Nitro-Salol would be made on the same lines as Salol (condensation of the Sodium Compounds of Salicylic Acid and Phenol), excepting that Para-Nitro-Phenol would be used. Phosphorous Oxychloride or Carbon Oxychloride would be employed to take up the Sodium. We have as yet had no actual experience in making the compound. See also R. Q. Brewster, Y.B.P. 1919, 130.

Dose.—10 to 15 grains (**0·6 to 1 Gm.**) 3 or 4 times a day in cachets. **Tablets**, 5 grains, are prepared.

White crystalline scales, tasteless; soluble in alcohol, ether, and alkalis, almost insoluble in water. It contains about 50% salicylic acid. ***Incompatible*** with Alkalis and their carbonates. It is unaffected by gastric juice, but decomposed by pancreatic ferment. Anti-febrile and anti-rheumatic. Used in chorea, neuralgia, sciatica, headache, and throat affections. Ointment 10% in Lanolin for psoriasis and other skin affections.

Acidum Cresotinicum. $C_6H_3.CH_3.OH.COOH$=152·104.
Syn.—ACIDUM CRESOTICUM.

There are three isomers of this composition, all having powerful action in rheumatism. The *Ortho*-Acid was thought to be a heart poison, but recently it has been shown to be not more toxic than pure Salicylic Acid.

The **Sodium Salts** of all three can be given in same *dose* as those of the homologous Salicylic Acid.

Fever of pulmonary phthisis was reduced by 30 grains of **Sodium** *Ortho*-**Cresotinate** 2° F. in 1½ hours. Does not cause singing in the ears, which prolonged treatment with Salicylate often does. Acute rheumatism has been well treated by this salt.—R. Stockman, B.M.J. ii./09,330,791; i./13,599. *For Antiseptic power v. Vol II.*

Uses. — Analgesic, antirheumatic and antineuralgic like the Aceto-Salicylates. Action similar. Soluble readily in water.

ACIDUM STEARICUM, U.S., P.Jap.

Stearinum, P. Austr. *Commercial Syn.* "STEARINE' wrongly so called. $C_{17}H_{35}COOH$=284·378.

This monobasic acid occurs as a hard white solid substance and is not entirely pure. It is prepared by decomposition with superheated steam of Stearin (the triglyceride of stearic acid contained with those of palmitic and oleic acids in tallow). ***Soluble*** about 1 in 18 of alcohol 90%. Readily soluble in ether.

Melts about 56° C. (132·8° F.), (U.S.). This melting point corresponds to a mixture of 40% stearic acid and 60% palmitic. A melting point of 58° C. (136·4° F.) would be better for some suppositories. *Vide* Glycerin. (P. Jap. has M.pt. 60–65° C. It is obtainable commercially with melting points 50° C. (122° F.), 52·5° C. (126° F.), and 56° C. (132·8° F.).

Commercially it contains 20 to 30% oleic acid. Iodine No. 21·7 would indicate about 24%. Pure stearic acid would of course have Iodine No. *nil*, which condition of purity is approached by successive re-crystallisations from alcohol.

Cocoanut Stearine.—A white firm fat melting at 84° F. (29° C.) suggested for use as suppository basis as having a melting point somewhat lower than cacao butter, which softens at 80° F. (26·6° C.), and melts between 88° F. and 93° F. (31·1° and 33·9° C.). It is obtained by chilling and pressing **Oil of Coconut** (Cocoa-nut Oil or Cocoa-nut Butter, **Oleum Cocos** P.G. ii.) *i.e.*, the oil or butter from the *Cocoanut Palm, Cocos Nucifera* Linné, hence to be distinguished from the product called Cocoa Butter (Oleum Theobromatis *q.v.*). Oil of cocoanut is solid between 40° and 50° F., and liquid at about 80° F., and has characteristic odour. It is used as a substitute for lard and largely in soap manufacture. The dried pulp of the Cocoanut is known as **Copra.** The endocarp or meat of the nut is said to be a powerful tænicide. The patient should drink the milk and then eat the flesh of the nut.—U.S.D.

Coconut Oil has usually very low Iodine number—about 8. The oil from the *rind*, however, gives as high as 25 or 40.—P.J. ii./11,325.

ACIDUM SUCCINICUM. P. Svec.

$C_2H_4.COOH.COOH = 118{\cdot}068$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Occurs on destructive distillation of Amber, as the oxidation product of a number of substances rich in carbon, *e.g.*, fats and fatty acids—treated with Nitric Acid. Also by fermentation of Malic Acid (Calcium Salt)—Liebig, or of Tartaric Acid, which is Dihydroxy-Succinic Acid.

Colourless crystals ***Soluble*** in Water 1 in 20, in Alcohol 1 in 9 Used chiefly as—

Ammonii Succinas.—$C_2H_4(COONH_4)_2 = 152{\cdot}136$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Crystalline salt soluble in water and alcohol.

In spasmodic pains, particularly spastic contractions of the uterus.

Sodii Succinas.—$C_2H_4(COONa)_2 + 6H_2O = 270{\cdot}148$. In dose as above in catarrhal jaundice. Soluble 1 in less than 1·5 water. Has also been given in delirium tremens.—M.Am.

Potassii Succinas. $C_2H_4\ (CO.OK)_2 + 3H_2O = 248{\cdot}30$.

A deliquescent powder; has been used in doses of 5 to 10 grains to control hæmorrhage. **Ferri Succinas.** Ferric Succinate, a reddish-brown insoluble powder, removes biliary calculi and relieves hepatic colic.

✱ **Alphogen** (T.M. 268074). *Syn.* **Alphozone.** DISUCCINYLDIOXIDE or SUCCINIC PEROXIDE.—$O_2 : (OC.CH_2.CH_2.COOH)_2 = 234{\cdot}12$.

Dose.—2 grains (**0·12 Gm.**) added to ½ tumbler of water. Tablets 1 grain. For local use 1 in 3,000 to 1%.

An amorphous odourless white substance with acid bitter and metallic taste. Acid to Phenolphthalein and Litmus

Soluble 1 in 100 of water (1 in 10 at 37° C.).

Uses.—Germicide and deodorant. 1 in 1,000 to 1 in 100 (Solutions to be freshly prepared and free from alkali), rapidly destroy *Streptococci* in pus, *B. diphtheriæ* in membrane, *B. coli* in fæces, and other bacteria.

Dusting Powder with Kaolin 5%, Unguentum 2% (Paraffin basis).

ACIDUM SULPHURICUM.

Syn. OIL OF VITRIOL. $H_2SO_4 = 98{\cdot}076$.

'*Poisonous.—Not to be taken.*'—*For further conditions of sale v.* p. 47. *Dose.*—1 to 2 minims (**0·06 to 0·12 Cc.**).

With Sp. Gr. 1·843 contains 98% by weight of hydrogen sulphate. *Off.*,—Sp. Gr. 1·841 *i.e.* 95%.

Preparation.—By passing SO_2 (made by burning sulphur) with a little nitric acid into leaden chambers into which jets of steam are also sent.

Use.—Very occasionally as caustic.

Pruritus has been treated by internal use of, even when alkalinuria is absent. Dose, 1 tablespoonful every 2 hours of 1½ to 2½% solution. The itching is said to rapidly disappear.

Antidotes.—Magnesia and *c.f.* Acidum Hydrochloricum.

Sulphuric Acid "Arsenic-free" is specially prepared to stand the Marsh-Berzelius Test 1 hour.

Acidum Sulphuricum Aromaticum (*Off.*). *Syn.* ELIXIR OF VITRIOL. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**).

This contains a small amount of (aromatic) ethylsulphuric acid. The preparation would be improved by carefully heating the mixture of acid and alcohol to encourage the formation of the vinous acid. Contains 12·9% *w/v.* of hydrogen sulphate, and has Sp. Gr. 0·917 to 0·923.

U.S. has sulphuric acid (93 to 95%) 100, Tincture of Ginger (1 in 5 alcohol 94·9% by volume) 50, Oil of Cinnamon 1, Alcohol (94·9%) to 1,000.

Acidum Sulphuricum Dilutum. (*Off.*). Sp. Gr. 1·069. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains 10% as also U.S., FR. CX., F. NORSK. and P HELV. PH. NED. is quadrinormal.

Carbuncles, boils, staphylococcic infections and certain streptococcic infections well treated by internal use of Dilute Sulphuric Acid—20 to 30 minim doses with 2 ounces of water every 4 hours (small doses in carbuncle are no use). Externally 1 in 20 Carbolised Vaseline. Cases of bronchiectasis and pulmonary tuberculosis where there is often a staphylococcic infection also benefited. Sputum becomes less purulent and much less in quantity, and in tuberculous cases fluctuations of temperature are less.—B.M.J. ii./08,407; L. i./13,749. As prophylactic and treatment in puerperal fever—see Therap. Ind.

Also effective in a case of severe acne and in a case of abscesses on the arms due to use of septic Morphine Solution.—L. i./13,562,643.

Incompatible with alkalis and carbonates. It precipitates barium and calcium from solutions of their salts, also soluble lead and silver salts.

Acidum Sulphuricum Fumans. *Syn.* Nordhausen Sulphuric Acid or "**Oleum,**" Sp. Gr. about 1·9. Contains some sulphuric anhydride disolved in sulphuric acid. Manufactured by distillation of dried Ferrous Sulphate in stoneware retorts. Ferric Oxide or **Colcothar** or **Polishing Rouge** remains behind. The formula $H_2S_2O_7$, *i.e.* $H_2SO_4 + SO_3$ contains about 45% SO_3. Commercially the range of SO_3 content is from 10% to 40%.

ACIDUM SULPHUROSUM.

$H_2SO_3=82·076$; $SO_2=64·06$.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

A colourless liquid, with strong sulphurous odour, and containing *Off.*, 5% of SO_2. Sp. Gr. 1·025.

Preparation.—By roasting sulphur or by heating copper and sulphuric acid, or carbon and sulphuric acid.

Uses.—This solution of Sulphurous acid is applied externally as a lotion—one part to two or more of water and sometimes a little glycerin added—for parasitic affections such as chloasma, ringworm, pruritus, thrush, and chapped hands, with very good results. It is sprayed into the throat for tonsillitis, diphtheria (better diluted) and asthma, or used as an inhalation, a teaspoonful to a pint of cold water. It is strongly antiseptic, and has been used in whooping cough by fumigating the room. Also diluted for fœtor of the teeth, *e.g.* in syphilis.

Internally it has been used in cholera (and is prophylactic). As a rectal injection, a 1 or 2% solution of the gas. Also for gastric fermentation accompanied by sarcinæ, as in typhoid (20 to 30 minim doses) every 2 or 3 hours.

For tuberculosis introduced as a method of bringing the system under the action of a diffusible stimulant. Normal Saline Solution containing 5% Sodium Bisulphite, 5% Calcium Chloride (as heart tonic) and 1% Sulphurous anhydride (SO_2). *Dose.*—5 Cc. of this solution injected into the buttocks. Subsequently less often as required. 3 Cc. for children. Phthisical symptoms said to have diminished. No albumen found in the urine even after 100 injections.—Sem. Medical, June 15, 1910, per Pres., Aug. '10,146.

Magnesii Sulphis.

$MgSO_3+6H_2O=212·476$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

White crystalline powder. Soluble 1 in 90 in water. Given in diphtheria and other infectious diseases. Large doses may be given with impunity. **Tablets** 5 grains.

Sodii Hyposulphis.—*Syn.* Sodium Thiosulphate (*Off.*), **U.S.** $Na_2S_2O_3+5H_2O=248·20$. *Dose.*—10 to 60 grains (**0·6 to 4 Gm.**) Crystals soluble in water 1 in 1. Insoluble in alcohol.

Uses.—As a lotion, 1 in 10 for chloasma, ringworm, &c. It may be made to evolve sulphurous acid as, *e.g.*, in the following : Sodium Hyposulphite 6, Diluted Sulphuric Acid 1, Water 32.

Useful in clearing out the intestinal tract and in lowering blood pressure (in arterio-sclerosis). B.M.J. i./06,126.

In Italy medical men and the general public demand sodium hyposulphite (specially re-crystallised). For internal use the dose is from 1 to 6 grammes as a purgative ; its antiputrescent action is said to be superior to that of the sulphite. While passing through the blood stream it is transformed firstly into sulphite and then into sulphate.—Ph. Notes.

For ringworm in young subjects with very delicate skins a solution of Sodium Hyposulphite (1 in 10) is often efficacious.—Whitla, Pract. Med p. 1538.

DISTEMPER in dogs is well treated by Sodium Hyposulphite First give a purgative of 4½ to 7½ grains of each Calomel and Scammony, then the hyposulphite, 9 to 15 grains in milk or sugar and water next day for 10 days or less.—P.J. ii./13,838.

Respirator Solution.—Sodium Carbonate Cryst. 60, Sodium Hyposulphite 52, Water 100. A proportion of Glycerin should be added to keep the wool or material moist. P. A. W. Self came to the conclusion that the above is the most satisfactory to neutralise both Chlorine and the Acids formed.—P.J. ii./15, 133.

ACIDUM TANNICUM.

Syn. TANNIN. $C_{14}H_{10}O_9=322{\cdot}15$.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.).

It is extracted from galls with ether containing a little alcohol and water.

Estimation by precipitation with an aqueous solution of Strychnine Acetate. It was found that after drying all Tannins gave the same result, using the factor 0·6558 for converting the Strychnine Tannate into Tannin.—S. R. Trotman, C.D. ii./13,851.

Soluble in water 1 in 1 slowly, and in glycerin, less so in alcohol 90%. Almost insoluble in ether and chloroform.

Incompatible with ferric salts, acids, alkalis, silver and other metals and with gelatin, *c.f.* Tannalbin *infra.* Furthermore, Tannin Solution precipitates the majority of alkaloids from solution, hence is occasionally employed as an antidote to these.

Uses.—Throat and mouth wash 1 to 2%. Astringent and styptic in powder form for epistaxis (by coagulating the albumin). Sometimes given in dysentery. Rectal injection of 30 grains in a quart of hot water, with or without opium, has been given in cholera. Burns have been treated with a 2 to 3% solution in ether painted over the part 2 or 3 times daily. For disinfecting surgeons' hands—rub with gauze soaked in 5% solution in alcohol. The hands become soft and smooth—remaining sterile until some time after the operation.

Glycerinum Acidi Tannici, atque cum Alumine, *v.*p. 428.

Gargarisma Acidi Tannici contains 10% of Glycerin of Tannin.

Ovules with Theobroma basis for vaginal discharges.—*v.*p. 610.

Pessus Acidi Tannici 10 grains each in theobroma oil basis, 120 grains weight.

Suppositoria Acidi Tannici (*Off.*).
3 grains with theobroma oil *q.s.* to 15 grains.

Ⓟ **Suppositories of Tannic Acid with Opium,** 1 grain in addition, or [P1] Morphine ½ gr.—W. H.

Aluminii Tannas.—TANNAL INSOLUBILE.

$Al_2(OH)_4(C_{14}H_9O_9)_2 + 10H_2O$ is made by precipitating a solution of Aluminium Trisulphate with Sodium Tannate (not Tannin as stated in the paper) or better by treating freshly made Aluminium Hydroxide with Tannin Solution.—W. H. M. As astringent for chronic catarrh of the respiratory organs —Y.B.P. 1913,122.

Albuminum Tannicum. P. Jap. *Syn.* ✱ **Tannalbin.** (TRADE MARK 216134/1899, renewed 1912; PATENT : see below, both became void). *Dose.*—8 to 15 grains (**0·5 to 1 Gm.**), P. AUSTR., PH. NED.

A compound of tannin with albumen, in pale brown insoluble, tasteless powder.

Manufacture.—According to the Patent Specification 6140 of 1896 Albumin 1 and Tannic Acid 2 are dissolved separately and mixed with stirring and the precipitate washed by decantation, etc., and dried. *Subsequently* the compound is to be heated for 6 to 10 hours at a temperature of 110° or up to 150° C. (This heating we found is of importance to render the Albumin portion resistant to solubility *v. infra.*—W. H. M.)

In a subsequent patent, 13,281 of 1896, the precipitate is directed to be left in contact with three times its volume of 90% Alcohol or twice its volume of 25% Hydrochloric Acid before filtering, washing and drying. This is said to obviate the necessity of heating the preparation as described.

The object of the preparation is to produce an Albumin Tannate (containing 50% of each of its components) which shall be soluble with difficulty in the stomach and shall dissolve gradually in the (alkaline) intestines.

TAMBACH'S TEST is used to ensure a satisfactory preparation. To determine the resistance to the stomach juice maintain at body temperature for three hours without stirring a mixture of 2 Gm. of Albumin Tannate with 100 Cc. of water containing Pepsin 0·25 Gm. and 20 drops of strong Hydrochloric Acid. The amount undissolved after washing with a little cold water and collecting on a weighed filter paper and drying at 100° C. should not be less than 1 Gm.

We found the effect of heating a sample to 120° C. is to render it less soluble in the digestive fluid than if dried at 60—70° C. only, *e.g.* 2 Gm. dried at 60° C. gave 0·76 Gm. of undissolved residue by Tambach's Test, whereas 2 Gm. of the same sample heated to 120° C. for 2 hours gave 1·2 Gm. of undissolved residue. It is of interest to note that the sample dried first at 60° C. lost 10% of its weight on heating to 120° C. for two hours.

A disinfectant soluble in the intestines, but unaffected by the stomach, given for diarrhœa.

Aluminii Boro-Tannas. *Syn.* CUTOL.

A solution of Tannin 1, Borax 4 in Water 80, is poured with stirring into Solution of Aluminium Sulphate 3 in Water 12, and precipitate collected and dried.

Uses.—Disinfectant and astringent in gonorrhœa and skin diseases.

Zinci Tannas. *Syn.* "SEL DE BARNIT."

Is obtained by treating Zinc Oxide 10 in Water 15 with Tannin 50 in Alcohol 45% 100. Dry at gentle heat. We have found this method satisfactory.

Used as ophthalmic application and for decubitus and other skin lesions.

Further **Tannates.** Details of making.—Y.B.P. 1913,125.

Di-acetyl-tannin. *Syn.* **Acetannin.** ✱ **Tannigen.** (TRADE MARK 275300/1905 and 322568; PATENT 1228/1894 ***Expired***).

$C_{14}H_8(COCH_3)_2O_9 = 406{\cdot}232$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachet.

A tasteless, insoluble powder, but rendered soluble by alkali. In diarrhœa. Dissolves in the intestine appearing in the urine as gallic acid. Should not be prescribed with alkali. P. G. V defines as mainly a mixture of Diacetyl and Triacetyl-Tannin.

Methyl Ditannin. *Syn.* ✱ TANNOFORM (T.M. 216873). $C_{29}H_{20}O_{18} = 656{\cdot}305$.

A compound of tannin with formaldehyde in reddish-white powder insoluble in water, soluble in alcohol and alkalis. Used as an antiseptic in ointment

(1 in 10) or dusting powder alone or with 1 to 4 parts of starch, for bedsores, hyperhidrosis, pruritus, eczema (particularly in interdigital eczema), and piles, In diarrhœa (*Dose*—from 1 to 20 grains according to age) and enteritis and for tender feet. Is official in P.G.V.

ACIDUM TARTARICUM (*Off.*).

$(CH.OH.\ COOH)_2 = 150{\cdot}068$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufactured from acid potassium tartrate by heating with water and sufficient calcium carbonate to almost neutralise, converting thus into insoluble calcium tartrate and soluble neutral potassium tartrate. The latter is also converted by aid of calcium chloride into calcium tartrate. The two portions of calcium tartrate are washed and then decomposed with the necessary quantity of sulphuric acid.

Soluble 10 in 8 water, 1 in 2½ alcohol 90%, 1 in 4½ glycerin, 1 in 120 ether 0·720, 1 in 5 absolute alcohol. Nearly insoluble in benzol and chloroform.

Incompatible with alkaline carbonates, and with potassium, calcium, and mercury salts.

Uses. For making Granular Effervescent Preparations, Effervescing Tablets (see Neutralisation Table for equivalents), and cooling drinks.

Specificity in Antiseptics.—This acid (as also Malic Acid) has been found to be active against *B. aerogenes capsulatus. Vide Vol. II.*

For details as to presence of Lead in Tartaric Acid and Method of Estimation, also for Acidum Glutaricum, Syn. Pyrotartaric Acid, see Vol II.

P1 ACONITI RADIX (*Off.*).

P1 *Aconite, Aconitine, and their preparations.*

Root collected from *Aconitum Napellus* (*Ranunculaceæ*) and dried. B.P. gives no dose but requires not less than 0·4% ether-soluble alkaloids. Fr. Cx. gives *Dose* (max. single), **0·1 Gm.**; max. during 24 hours **0·3 Gm.** That of P. Belg. in powder dried at 100° C. contains 0·8% alkaloids. If more, dilute with milk sugar

P.G. and Fr. Cx.—Selected heavy roots from the wild plant collected before end of the flowering season. U.S. contains 0·5% ether-soluble alkaloids, with average dose ½ grain (**0·03Gm.**)

Use.—Anodyne, diaphoretic, diuretic.

Externally the liniment as such or mixed with chloroform or belladonna liniment in neuralgia and rheumatism (causes tingling and numbness).

Internally the tincture diminishes the force and rate of the pulse, especially in the early stages of fevers and mild local inflammations such as feverish cold, laryngitis, and first stages of pneumonia, erysipelas and gonorrhœa. It also relieves the pain of neuralgia, pleurisy and aneurism. Large doses cause tingling of mouth and skin generally.

Internally for neuralgia has been advised, but when given thus the benumbing effects of the drug are not produced.—P.J. ii./10,298.

Acute tonsillitis. Children generally well treated by Aconite. For a child 5 to 10 years old, 1 to 2 minims of Tincture.—Yeo.

We are told by the physiologist experimenting on small animals that Aconite is of no avail in reducing the frequency of the pulse, but in clinical practice we are familiar with good results obtained in some manner from its use.—Sir Dyce Duckworth.—B.M.J. i./11,1217.

In an investigation on the effects of digitalis and other drugs on the heart Aconite hitherto regarded as a retardant of cardiac action, was found to be inert in medicinal doses.—J. Mackenzie. L. ii./11,956.

P1 **Aconiti Folia** may contain as much as 0·6% total alkaloid.

Fr. Cx. employs fresh leaves for making Alcoolature d'Aconit, 1=1 using 95% alcohol for macerating 8 days. Max. single dose 1 Gm., max. daily dose 5 Gm.

Antidotes.—Apomorphine hypodermically or as emetic; stimulants; Amyl Nitrite. Atropine Sulphate $\frac{1}{50}$ grain hypodermically. Digitalis tincture 20 minims hypodermically in course of 4 hours was successful.

Aconite poisoning from taking Liniment in error. As Ipecacuanha Wine,—a cardiac depressant—had been given as first antidotal treatment, it was thought well to give only one mustard emetic to save the enfeebled heart. Head was kept low—feet raised, a sinapism was placed on the heart and hot flannels to the extremities and abdomen. Strychnine and digitalis hypodermically and brandy per rectum. Artificial respiration kept up unceasingly, recovery after six hours. Quantity of Aconite was sufficient to kill six persons.—L. i./11,162.

Poisoning by a tablespoonful of Liniment containing 40 minims each Lin. Aconiti, Lin. Belladonnæ, Lin. Chloroformi and Tinct. Capsici with 80 minims Gaultheria Oil. There was no dilatation of the pupils as would have been expected, nor odour of Wintergreen, but vomiting occurred smelling strongly of it. Recovery under Liquor Strychninæ, 10 minims hypodermically and 8 ounces of hot strong coffee into the rectum. A remarkable recovery taking the aconite into account, which amounted to 35 times the maximum dose of the official tincture.—L. ii./10,1270.

For Aconite and Belladonna combined see also 'Poisons and Antidotes.'

P1 **Chloroformum Aconiti, B.P.C.** 1=1. Prepared as Chloroformum Belladonnæ.—B.P.C. 1907.

P1 **Extractum Aconiti Radicis Alcoholicum.** Fr. Cx. (Extrait d'Aconit) prepared from the root with 70% alcohol and standardises to 1% alkaloids. *Max. single dose,* ½ grain. Max. during 24 hours 1½ grains approx.

P1 **Fluidextractum Aconiti, U.S. IX.**

Average dose.—**0·03 Cc.** (½ minim). Standardised to 0·5 Gm. ether soluble alkaloids of Aconite in 100 Cc.

P1 **Linimentum Aconiti** (*Off.*)

Prepared by macerating and percolating the root with Alcohol 90%. Useful in neuralgia. *It is not suitable for painting on the gums.*

Should contain 0·2% *w/v* ether-soluble alkaloid.

9 minims of Aconitine liniment=about $\frac{1}{30}$ grain aconitine has proved fatal.

P1 **Linimentum Aconiti Compositum.** G.H.

A.B.C. Liniment.

Aconite Liniment, Belladonna Liniment, Chloroform Liniment, equal parts. To be well shaken before use, as the olive oil in the chloroform liniment is not soluble in the other ingredients. B.P.C. uses Liniment of Aconite 2, of Belladonna 2, Chloroform 1. Miscible. P1 **Linimentum Aconiti cum Chloroformo**, B.P.C. Chloroform 1, Aconite Liniment 7.

The Oil in the original 'A.B.C.' formula seems to be essential—otherwise proves too irritant to sensitive skins.

Poisoning by ½ ounce of A.B.C. liniment. Liquor Strychninæ and saline enema 2 pints, containing 2 ounces brandy, saved life. Afterwards ¼ grain morphine. The lethal effect of the aconite was abolished by stimulating action of the atropine.—B.M.J. ii./08,372. Another case.—B.M.J. i./96,399.

See also Poisons and Antidotes.

P1 **Pilula Aconiti.**=2 minims of tincture, *i.e.* ⅕ grain approx. of Root in each. *Dose.*—1 hourly.

P1 **Tinctura Aconiti** (*Off.*).

Caution.—About twice as strong as B.P. '98.

Strength 1 in 10 approx. by percolating dried root in No. 40 powder with 70% alcohol and standardising to 0·04% ether soluble alkaloid.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**). As a febrifuge 2 minims every 10 minutes or quarter of an hour for an hour, then repeat dose every hour till skin acts well and temperature is reduced.

Fr. Cx. has this strength made with 70% alcohol. It is termed *Teinture d'Aconit au dixième* and has max. single *dose* 9 minims approx.

P.G. (1 in 10). Maximum single dose, 0·5 Gm. Max. daily dose, 1·5 Gm. U.S. has 1 in 10, assayed to not less than 0·045 or more than 0·055% ether soluble alkaloids. Average dose 5 minims. **P. Belg.** contains 0·05% alkaloids.

P1 **Tablets** are prepared each equivalent to 2½ minims. To be directed to be dissolved in a little water.

P1 **Pastilli Aconiti,** and P1 **Trochisci** contain each 1 and ½ minim of Tincture respectively. Given in fevers and mild inflammatory conditions.

P1 **Fleming's** and **Turnbull's Tinctures** of **Aconite** are about six times the (*Off.*) strength. They are used externally, and were given internally in doses of 1 to 5 minims.

Pharm. Form. says it should be particularly noted that Tincture of Aconite *Fleming* of all prescriptions, except British and American, is not this preparation but a 1 in 10 tincture.

Tincture of Aconite (*Fleming*) combined with equal volume of Weak Tincture of Iodine (*Off.*) is frequently ordered to be painted on the gums for pain.

P1 ACONITINA (*Off.*).

Syn. Acetylbenzoylaconine. $C_{34}H_{45}NO_{11}=643{\cdot}54$.

P1 **Crystallised Aconitine.**

Dose.—$\frac{1}{600}$ grain to $\frac{1}{200}$ grain (**0·0001 to 0·0003 Gm.**), and may be increased if desired with extreme caution, the maximum single dose being 0·001 Gm., the maximum dose during 24 hours 0·003 Gm. —M. Am. 1907.

Fr. Cx. gives 0·0005 Gm. as maximum in 24 hours.

B.P. gives no dose, U.S. *average dose* $\frac{1}{400}$ grain.

An alkaloid obtained from *Aconitum napellus* root and dried leaves —content about 0·03%. In colourless crystals. ***Soluble*** in dilute acids, alcohol and chloroform (1 in less than 1), less readily soluble in ether, and almost insoluble in water and petroleum ether ; melts at 198° C. In weak acetic solution yields a red crystalline precipitate with potassium permanganate.

U.S. tests for pseudaconitine and atropine by Vitali's test.—*q.v.*

A drop of dilute solution placed on the tongue produces a characteristic tingling sensation.

Antidotes vide Aconite.

Uses.—Employed externally (*vide* Unguentum Aconitinæ and Oleatum Aconitinæ) in neuralgia, *avoiding mucous membranes, and raw skin.* Internally in the form of a pill is a depressant, calmative, and diaphoretic.

$\boxed{\text{P1}}$**Aconitinæ Nitras.** $C_{34}H_{45}NO_{11}HNO_3=706{\cdot}558$. A crystalline stable salt, soluble in water and alcohol. *c.f.* Vol. II.

Dose.—$\frac{1}{600}$ grain (**0·0001 Gm.**), hypodermically.

$\boxed{\text{P1}}$**Hypodermic Tablets** ($\frac{1}{640}$ grain), to be dissolved in warm water.

$\boxed{\text{P1}}$**Granules of Aconitine** Fr. Cx. and of **Aconitine Nitrate** Fr. Cx. contain $\frac{1}{10}$ mgr. in each, and are coloured pink.

$\boxed{\text{P1}}$**Aconitinæ Hydrobromidum.** $C_{34}H_{45}NO_{11}.HBr.2\frac{1}{2}H_2O=769{\cdot}508$, and $\boxed{\text{P1}}$**Aconitinæ Hydrochloridum** are crystalline Salts with dose as for the Nitrate.

$\boxed{\text{P1}}$**Oleatum Aconitinæ.**

Aconitine 2, Oleic Acid by weight 98. Dissolve ; may be perfumed —is painted on the skin (avoid broken) for neuralgia.

$\boxed{\text{P1}}$**Unguentum Aconitinæ** (*Off.*).

Aconitine 1, Oleic Acid (by weight) 8, (1 grain=2 drops): heat gently to dissolve, and add Lard 41. Mix thoroughly. Best freshly prepared. A piece of the size of a bean is gently rubbed in for facial neuralgia, avoiding broken skin and mucous membranes.

ADEPS LANÆ.

Wool Fat (*Off.*). **U.S., Ph. Ned.** Anhydrous Lanolin.

The purified yellowish cholesterin fat of sheep's wool, M.pt. about 40° C. Sheep's wool yields from 10 to 30%.

Trade Marks: 'Lanoline' 50214 (Class 48) and 50215 (Class 3), 1886, renewed 1899 and 1913. Patent 4992/1882 *expired*. The specification states that 'the invention relates to a new or improved manufacture of fatty matter from Wool Fat termed "Lanolin."' The process described is of centrifugalising waste liquors of wool washing and purifying by a suitable solvent.—*c.f.* C. D. March 20/15.

Manufacture.—Adeps Lanæ B.P. is now a British made article. This product had for many years been imported from Germany, and a good deal of experimental work was necessary at the outset in this country to perfect certain details, for example in the matter of colour, odour and proneness to acidity. The British made article is now 'better than B.P.' The *Lancet* of November 11th, 1916, for example, found only 0·42% acidity in a British product against a presumable limit of 0·7%. (Note a slip here in the B.P. directions. 2 Gm. should be taken for titration, not 0·2 Gm.)

Soluble 1 in 25 ether, 1 in 18 oil of turpentine (both with some residual matter), almost insoluble in alcohol 90%

Adeps Lanæ can only be saponified by alcoholic solutions of Potash under pressure—paraffin can be easily detected by this means.

Adeps Lanæ Hydrosus. **Hydrous Wool Fat** (*Off.*). Commonly known as 'Lanolin.' Wool Fat 7, Distilled Water 3. Melt and mix. Fr. Cx. has 25% water.

Yellowish white ointment basis. More water, up to about equal weights of fat and water, may be incorporated with it without affecting its consistence. Soluble partly in alcohol, while ether and chloroform dissolve only the fats it contains.

Wool Fat is readily absorbed by the skin (especially if washed with ether). It helps absorption of narcotic extracts, quinine, iodine, potassium iodide and chaulmoogra oil.

When an ointment containing Mercuric Chloride or Carbolic Acid is ordered, it is usually intended for antiseptic purposes, therefore the *anhydrous* should be used, otherwise caustic action may result. —L. i./09,54.

Sapolanoline. Lanolin 5, Soft Soap 4. For acne and eczema.

Unguentum Lanolini.

Lanolin (hydrated) 2, Soft Paraffin or Vaseline 1. Mix. May be perfumed to form **Lanolin Cream.** Less sticky than Lanolin.

Lanolin, lard and soft paraffin, *p.æq.* melted, give a useful basis, as also Wool Fat 9, with Almond Oil 1. **Unguentum Lanæ Compositum** (*Off.*), is Wool Fat 2, Prepared Lard 2, Paraffin Ointment 1.

For other Ointment bases see Unguenta and for M.pts. of Fats, Table, *Vol. II.*

Cholesterin $C_{27}H_{45}OH + H_2O = 404·519$, is prepared from wool fat by saponifying the same with potash, and extracting the cholesterin with ether.

Tuberculosis is well influenced by giving cholesterin, to which it is thought to have antidotal power, as well as to strychnine and curare. Lecithin and cholesterin are antagonistic. Lecithin was found to increase the poisoning power of curare and cholesterin to reduce it. Cholesterin is capable of arresting ferment production by lecithin. In carcinomatous tissue active intracellular ferments are thought to be present which are first set in action by lecithin. This substance is always found in marked amount in rapidly growing tissues. The administration of cholesterin will eliminate lecithin. Fifteen cases so treated showed diminution—and indeed disappearance—of the tumours.—M.'08,184.

For pernicious anæmia, cholesterin in form of cream and butter *ad lib.* has been given with success. (Cholesterin is antagonistic to hæmolysis.)—L. i./09,69.

Blackwater fever has been treated by Cholesterin internally with success. Treatment based on action of Cholesterin in different kinds of hæmolysis. Amelioration rapid—the urine beginning to clear in

2 to 6 hours after first dose. Also given as preventive. Generally gave 2 to 4 doses of 1 Gm. with intervals of 4 to 6 hours, suspended in milk.—Transvaal Med. Jl., July '10, per Pres. Oct. '10, p. 183.

ÆTHER (*Off.*).

Ⓟ*Applicable to Ireland.*

$C_2H_5.O.C_2H_5=74{\cdot}10.$

Syn. ÆTHER SULPHURICUS ; ETHYL OXIDE.

Dose.—45 to 60 minims (**3 to 4 Cc.**), or 15 to 30 minims (**1 to 2 Cc.**) repeated.

Manufactured by the distillation of Sulphuric Acid and Alcohol—Ethyl Hydrogen Sulphate being first formed which reacts with a further quantity of Alcohol liberating Æther and Sulphuric Acid again ; in this manner the Acid will react with a very considerable quantity of Alcohol. Sp. Gr. 0·720.

Soluble 1 in 10 of water, and the ether similarly dissolves about the same amount of water. Is miscible in all proportions with alcohol. Ether is a solvent for a number of alkaloids, fats, resins, and of mercuric perchloride and biniodide, also of bromine and iodine.

Commercial Varieties in General Use.

(1) *From Pure Alcohol.*

Æther Purificatus (*Off.*). For inhalation as anæsthetic. **'Æther.'** PH. NED., P. Helv. and P. Jap. Sp. Gr. 0·720, *Syn.* **Æther Purissimus, Ether officinale, Æther pro Narcosi.**

In our own and several Continental Pharmacopœias this is directed to be carefully tested and preserved.

Methyl Compounds, Formaldehyde and Acetone in Purified Ether.—A. J. Jones, B.P. Conf., 1919.

(2) *From Methylated Alcohol.*

Ether, 'Methylated,' Sp. Gr. 0·717 to 0·719.

Contains a little methylic ether, and is specially adapted for spraying to produce local anæsthesia, as it begins to boil below 27° C. (80° F.), and is free from water. It is not adapted for producing general anæsthesia.

Rectified Ether, Sp. Gr. 0·720. FOR GENERAL ANÆSTHESIA.

Ether, well washed to purify it and redistilled. For producing general anæsthesia, if standing the tests given for purified ether.

Sterules, Anæsthetic, contain 1 and 2 ounces (30 and 60 Cc.) of this Ether for the operating bag and (being sealed) for hot climates.

Methylated Ether, Sp. Gr. 0·730 and 0·735.

Is adapted for pharmaceutical extraction purposes, ice machines, &c. For photography a purer preparation, Sp. Gr. 0·725, is made.

Uses.—Internally Ether is a rapid stimulant in syncope. Is carminative. May relieve dyspepsia and asthma. Hypodermically it saves many lives threatened by syncope, collapse, and shock from hæmorrhage and injury, but a pharmacologist says it is not a direct cardiac stimulant. It depresses nerve tissue, in very large doses it tends to depress muscle tissue, including cardiac muscle, but it never excites.—B.M.J. ii./09,329,540.

For general anæsthesia ether produces less depression on the heart than chloroform, but its use is unpleasant both to the patient and to the operators. Its suffocating action on the patient, if suffering from any lung or bronchial affection, is very irritating, and has proved fatal. Care must be taken not to employ it near a light; its vapour is 2½ times heavier than air and very inflammable, and as an anæsthetic it has to be used freely.

Historical.—Some doubt seems to exist as to who actually used ether first. Previously we stated W. T. G. Morton was the first administrator,—Oct. 16th, 1846, at the Massachusetts General Hospital. Haydn's Dict. of Dates states Dr. C. J. Jackson, of Boston, first gave it for insensibility to pain, and directed Morton in its first use in surgery. Now it appears the credit is due to Crawford Williamson Long, who first administered ether as an anæsthetic to his patient, Mr. William Venables, on March 30th, 1842, in Jeffersonville Georgia

Dangers from Ether are usually respiratory and due to excess of saliva Atropine hypod. before the ether prevents this. Inversion, pulling the tongue and slapping the back usually expels mucus.—R.D.H.

Crile's Nasal Tube method of giving Ether.—Less Ether is required than by employing the ordinary way using the open drop method. An injection of Morphine ¼ grain with Atropine $\frac{1}{75}$ grain is given an hour before the operation. Oxygen in addition not found necessary.—L. ii./09,364.

With flannel or with lint in the open method (Skinner's mask) so adjusted that all inspirations and expirations pass through the fabric, a more or less equable atmosphere containing approximately 8 or 9% of ether vapour may be depended upon.—L. i./12,217

As an anæsthetic, **rectal use** of Ether is favoured by some, *e.g.*, where presence of the Ether cone over the face would hinder the operation; or, secondly, in diseased condition of the lungs. Contraindicated in diseased state of the intestines and generally in abdominal cases. Several advantages are claimed. Cunningham does not give a definite dose; he, however, says a theory advanced by M. Vijux-Tyrode is that it requires a definite pecentage of Ether in the entire circulation to produce complete surgical anæsthesia. In human beings this amounts to a little under six volumes per cent.—New York Med. Jl., Apl. 30, 1910, pp. 904–909, especially p. 907, see also M.A. 1911, 160.

See also Air or preferably Oxygen and Ether Mixture per rectum.—"Annals of Surgery." A mouth tube is sometimes added.

Deaths during ether anæsthesia.—L. i./00,45 ; Pr. liii./367; B.M.J. i./01,574
See also Atropine and open Ether, p. 109

Sterules of Ether contain half a drachm in each for hypodermic injection as a dose in heart failure. 20 to 60 minims have proved a successful restorative in typhoid fever and for dyspnœa, but *c.f. antea*. These are made with 0·735 ether.

Sciatica treated by injection of ether with either cocaine or morphine subcutaneously into the sciatic nerve. 5 minim doses of ether with 2 minims of 1 in 12 cocaine or morphine injection 3 minims with 2½ inch needle. Unless patient involuntarily shoots out his leg the sciatic nerve has not been touched.—B.M.J. ii./08,1080.

Oxygen and Alcohol administered during anæsthesia by Ether or other Anæsthetics. Apparatus is described by means of which

Oxygen is bubbled through Absolute Alcohol, and thence the combined vapour mixes with the anæsthetic in a mask.—L. i./11,331. *c.f.* **Oxygen and Alcohol Administration.** The apparatus consists of a cylinder of Oxygen, wash-bottle containing Alcohol with exit tube above leading to a Schimmelbusch mask or Hewitt's modification, which is specially adapted for giving Oxygen with anæsthetics. These are joined together in series in this order.

Oxygenated and warmed Ether as a general anæsthetic.—B.M.J. i./10,320.

Prolonged Anæsthesia under Ether alternately with Gas and Oxygen.

With regard to Ether, the experience was that this anæsthetic used indiscriminately may lead to serious reduction of vitality. Temperature sometimes remains subnormal for many hours. Nitrous Oxide in connection with Oxygen might be more generally used, but it causes inconvenient rigidity, also faintness, dilated heart, persistent vomiting, etc., but by using Ether alternately with 'Gas' and Oxygen these objections in great measure disappear Rigidity can be entirely avoided. The method consists in anæsthetising the patient with Ether, and when a certain degree of Ether saturation is reached changing to Nitrous Oxide and Oxygen—the latter being again dropped in favour of Ether on certain indications, and so on. The details are—when Ether anæsthesia is thoroughly established Nitrous Oxide and Oxygen in proportion of 96 or 95 to 4 or 5 is given. The corneal reflex, if still present, but dulled before the change, will now be abolished after a few breaths of gas, but the pupil will remain small and colour good. After two minutes or so the Oxygen must be increased to 12, 15 or 20%. Frequent breaths of fresh air are admitted, and generally at the end of five minutes it is advisable to return to Ether. This second Ether will probably extend over five minutes, after which Gas can be given for 10 minutes.

As the operation proceeds the Ether applications become shorter and the intervals between them longer. The anæsthesia is even, and shock during and after operation seems to be very slight. The method is applicable to a large variety of patients and cases. There is a wide margin between light and deep narcosis. Post operative conditions good. Nausea less than after open Ether. Rebreathing was allowed on a few occasions without apparent detriment.

In the discussion it was thought that the amount of Nitrous Oxide necessary must be very great, and hence the method seemed as if it would be cumbersome. The question of post-operative vomiting is fully gone into.—Fleming P.R.S.M. Sec. Anæsthetics, Dec. 10, p. 1, *et seq.*

Oil of Orange. ***Effect of, on Anæsthesia.***

It is stated that an ounce of Essential Oil of Orange and 3 ounces of Ether placed in the hot water bottle of Gwathmey's three bottle vapour anæsthesia apparatus, and Ether in the other two bottles, cause not only the odour of the anæsthetic to be completely disguised, so that the patient is unable to tell when its administration begins, but anæsthesia is improved. The result may be due to the pleasant sedative effect.—New York Medical, per Pres.

Atropine and 'open Ether' administration.

An Atropine injection is given 1 hour before the ether to prevent the secretion of mucus in the air passages which may otherwise be caused by ether.—H. Bellamy Gardner, B.M.J. i./12,422.

Enucleation of tonsils by dissection is best done under open ether preceded by 1/100 grain atropine. Suitable for all patients from six months upwards. —H. Tilley, B.M.J. i./19,781 ; ii./19,27. (A death under C_2E_5 and C_3E_1—H. S. Gabbett, *ibid* i/19, 739.)

Anæsthesia. A modification of the open ether method.—F. W. Silk, B.M.J. i./19,635.

Crile's method of shockless surgery.—It consists of (1) a preliminary injection of Scopolamine to allay the patient's fear of the impending ordeal; (2) general anæsthesia with Ether, followed by (3) local anæsthesia with Novocain 1 in 200 combined with Adrenalin at the site of incision, and Quinine-urea-hydrochloride 0·75% solution into the peritoneum in cases of gastro-enterostomy. The object being to keep the brain free from shock before, during and after the operation.—W. I. De C Wheeler, P.P.C. i./14,332.

Ether Infusion Anæsthesia by means of Saline Solution.

Burghardt. the originator of the method of Infusion Anæsthesia, used an ordinary infusion apparatus containing a 5% solution of ether in normal saline The present method is a modification of the above. An hour before the induction a hypodermic injection is given which consists of (in the case of a fairly robust adult) Scopolamine $\frac{1}{100}$ grain, Morphine $\frac{1}{6}$ grain, and Atropine $\frac{1}{100}$ grain (other cases according to age and condition of patient, etc.). The patient being on the operating table, the selected arm is bandaged to a splint, vein exposed (a few drops of eucaine may be used)—cannula tied in and the solution run in rapidly. Induction usually lasts about ten minutes. The apparatus used consists of a reservoir containing a 5% solution of ether in normal saline. fixed about 8 feet above the floor level, the solution by means of a pipette drips into an indicator (capacity 8 ounces) fixed below this and from thence into a warming chamber to which the cannula is attached. The apparatus is controlled by a single tap placed just below the indicator. This tap, controlling the drips of the solution, affords an excellent index of the rate at which the solution is entering the vein.

The advantages claimed for this method of anæsthesia are the following :—

Surgical anæsthesia may be attained with 8 ounces of the solution, while for maintenance of the anæsthesia one pint an hour (1 ounce of ether) is in most cases enough. Great flexibility, patient can be adjusted with great nicety. Patient comes round within a few minutes. Post-anæsthetic vomiting and pulmonary irritation are both rare.—F. Rood, B.M.J. ii./11,974.

Intravascular infusion has been employed into the arteries, but owing to danger of embolism and thrombosis this method is little used.—D. W. Buxton's "Anæsthetics," 5th Edn.

Solubility of Ether in Normal Saline.—At 15° C. 11·87 Cc. of 720 Anæsthetic Ether dissolve in 100 Cc. of Normal Saline (of strength 0·91% NaCl by weight).—R. R. Bennett, P.J. ii./12,146.

Ether Saline infusion compares favourably with other methods –6, 7 or 8% can be safely used A 10% solution may produce hæmoglobinuria. It is best to begin with 5%, and if desirable to lessen the total amount of Saline infused, this strength may be increased up to 10%, as hæmolysis is less liable to follow this proceeding than that of starting with the higher percentage. The method is suitable even for the old and feeble. Recovery is rapid and post-anæsthetic vomiting rare.—F. Rood, B.M.J ii./12,608 ; L. ii./12,1801. D. W. Buxton's "Anæsthetics," 5th Edn.

Strength $7\frac{1}{2}$% and amount raised from 200 to 600 Cc. given in 3 to 7 minutes. In one case over 2 litres of the Solution were given.—G. A. H. Barton, B.M.J. ii./12,610.

Ether-Saline Intravenous Anæsthesia (5% solution). Temperature of the Solution must not exceed 99° F

H. S. Souttar described an apparatus for giving.—E. G. Schlesinger, L. ii./12,1220.

Scopolamine-Morphine Atropine with Ether Saline.—

Scopolamine (1/100 grain) with Morphine (1/6 to 1/4 grain) and Atropine (1/100 grain), given about $\frac{3}{4}$ hour before operation—under 5% Ether Saline. The combination is very useful as the amount of Ether is reduced to a minimum. It is especially suitable for head, throat, etc., operations, as the anæsthetist is not in the way. The patient is spared the disagreeable sensations of inhalation method. No irritation of the respiratory organs; no after effects.—F. L. Napier, Glas. Med. J.l, July, 1912.

Intramuscular Etherisation.—

Ether injection into the buttocks, 0·45, 0·8 and 0·8 Cc. respectively administered to three patients. In the first Ethyl Chloride was necessary, and in the second and third Chloroform to hasten anæsthesia. Another operator found that he failed to induce anæsthesia, though 60 to 70 Cc. in 10 Cc. doses were injected. The patient was drunk in consequence 24 hours, and became very excited.—L. ii./12,1802.

Intramuscular injections of Ether to produce general anæsthesia. Successive injections of 2 to 5 Cc. into gluteal region—into each side alternately. Amount used roughly 1 Cc. per kilo body weight. Advantage in head and neck operations.—B.M.J. ii./13,394.

Intratracheal Insufflation of Ether.—

Almost incredible operations have been done with this method on dogs, *e.g.*, complete removal of one or more lobes of the lung, complete division and suture of the thoracic œsophagus and complete division and suture of the transverse arch of the aorta. Employed in 25 cases with success.—B.M.J ii./12,112; ii./13,393, 1621.

The method will maintain anæsthesia after it has been established by the usual manner. A tube ⅔ of the diameter of the trachea is introduced into it nearly to its bifurcation. A fairly rigid silk woven catheter 30 Cm. long is used—the average size for an adult being No. 22 or 24 French. The anæsthetic—Ether, or a mixture of Oxygen and Ether—is introduced by means of a pump or mechanical blower,—Elsburg's Apparatus is probably best. By this means respiration with full aeration persists, but with lessened respiratory movements.—D. W. Buxton's "Anæsthetics," 5th Edn.

Pharyngeal Insufflation Anæsthesia is a method of prolonging Ether anæsthesia after it is established by ordinary methods. The vapour is given through the nose by means of Crile's tubes, the mouth and nasopharyngeal space having been previously carefully cleansed.—D. W. Buxton's "Anæsthetics," 5th Edn.

For a further method of Intravenous Anæsthesia see Paraldehyde.

Oil Ether Anæsthesia. *Syn.* COLONIC ABSORPTION.—A mixture of Olive Oil and Ether in definite proportion and amount slowly introduced *per rectum.* An evolution of Intravenous Anæsthesia.

For children under 6 a 50% solution is used, allowing 1 ounce for every 20 lbs. of body weight. This is non-irritating and no preliminary medication is wanted. Between 6 and 12 years use 55 to 65% solution without preliminary medication. Keep the patient quiet and allow 20—30 minutes for the full effect. Use 1 oz. for every 20 lbs. body weight as before. Between 12 and 15 years use the same percentage and amounts, with possibly the addition of 1/12 grain Morphine and 1/200 grain Atropine hypodermically as a preliminary. From 15 years upwards a 75% mixture is used with same amount as before—1 oz. to every 20 lbs. It will be seen, therefore, that for an *adult* weighing about 160 lbs., 8 ozs. of the mixture would be wanted (*i.e.*, Ether 6 ozs. and Olive Oil 2 ozs.). The 8 ozs. should be passed in slowly, *i.e.*, it should take 5 minutes.

The method is claimed to be perfectly safe. The anæsthesia is automatically safeguarded by the gradual and equal absorption of the Ether from the colon, and at the same time its rapid evaporation from the lungs. A further reason for the safety is the affinity of the Oil and Ether for each other.—J. J. Gwathmey, L. ii./13,1756.

The administration of Ether vapour *per rectum* has been employed and found to answer admirably for operations about the mouth, nose and postbuccal cavities. D. W. Buxton's apparatus consists of an Ether receiver holding 2 or 3 ounces and surrounded by a vessel containing water kept at 120° F. The vapour is conveyed to the rectum by a tube which has a glass intercepting drip chamber to prevent the passage of any liquid Ether which would be liable to cause dangerous results.—D. W. Buxton's "Anæsthetics," 5th Edition. See also B.M.J.E. i./15,46.

Ether (4 ounces) and Oil (2 ounces) as anaesthetic per rectum in diverse operations with success.—H. M. Page and G. B. Mower White.—L. ii./17,643.

Anæsthesia by **Oral Administration**: Ether 50% in Liquid Paraffin 1 to 2 ounces effectual in 90 seconds—probably the safest general anæsthetic and not followed by nausea. A little anaesthetic by inhalation may be wanted in addition. The dose may be sandwiched between mouthfuls of Port Wine. Useful for dressing wounds —J T. Gwathmey and H. T. Karsner.—B.M.J. i./18 254.

Application of Ether to wounds employed in such inflammatory affections as peritonitis, periostitis, etc. Ether compresses considerably relieve the congestion.—M.P.C. ii./11,377.

Wounds have been swabbed out thoroughly with Ether (without watery solution beforehand).—B.M.J. i./15,398, also irrigated with 2% of Ether in lukewarm water with benefit.—A. Distaso and T. R. Bowen, B.M.J. i./17,259.

Infected wounds treated with Ether as antiseptic dressing. There was no sign of infection throughout the process nor rise of temperature.—B.M.J.E. ii./15,41.

Also by the Carrel-Dakin method of irrigation but it is costly and causes intense cold.—B.M.J. ii./17,598.

Ether is used as a menstruum and vehicle for skin medication, on account of solvent action on sebaceous secretion. Ethereal Tinctures and Solutions of Belladonna, Capsicum, Iodine, and Menthol are prepared.

Preparations.

Perles of Ether, 3 minims in each. *Dose.*—1 to 4.

Spiritus Etheris (*Off.*). Ether 1, Alcohol (90%) 2.

Dose.—60 to 90 minims (**4 to 6 Cc.**), or 20 to 40 minims (**1·2 to 2·5 Cc.**), repeated.

The older formula is occasionally prescribed, viz. :—

Spiritus Ætheris Compositus (B.P. '98.).

Syn.—HOFFMANN'S ANODYNE, Liquor Hoffmanni, but the simple Spirit of Ether is now called Hoffmann's Anodyne abroad.

Mistura Ætheris cum Ammonia (*Martindale*). *Dose.*—1 to 2 ounces. Spirit of Ether 3, Aromatic Spirit of Ammonia 3, Water to 48. A rapid stimulant. **Gt. Orm. H.** has Spirit of Ether 3½ minims, Aromatic Spirit of Ammonia 3½ minims, Tincture of Orange 2 minims, Chloroform Water to 1 drachm, for a child one year old.

Lotio Ætheris Composita.

Hoffmann's Anodyne 250, Ammonia Solution 4, Distilled Water 25, Pilocarpine Hydrochloride ½; Spirit of Lavender 25. For hair falling off, applied with friction, after washing with soap.—B.M.J.E. ii./09,24. *Caution: Inflammable.*

Spiritus Ætheris Nitrosi (*Off.*).

Dose.—15 to 60 minims (**1 to 4 Cc.**).

An alcoholic solution containing ethyl nitrite (1·52 to 2·66% by weight), aldehyde and other substances.

For the Decomposition and Volatilisation of this preparation on storage, see Vol. II.

Uses.—Antipyretic, diaphoretic, diuretic, and stimulant. Relieves the spasm and pain of asthma, dysmenorrhœa, angina pectoris; also the pain of the passage of renal calculi and gall stones.

U.S. requires 3·5 to 4·5% ethyl nitrite.

Incompatible with Potassium Iodide (*c.f.* Vol. II.), also with Phenazone unless previously neutralised with Sodium Bicarbonate; also incompatible with Salicylates and Ferrous Sulphate.

Ethyl Nitrite is the active ingredient; the other ingredients (Aldehyde, Ethyl Nitrate, Alcohol) play a subordinate part and of little practical importance. As there is a rapid loss of Ethyl Nitrite on mixing with water, it is best prescribed as such to be diluted just before use.—C. R. Marshall and E. Gilchrist, B.M.J. ii./15,125.

It is stated that it does not affect the kidneys nor the sweat glands; it is neither diuretic nor diaphoretic.—P.J. ii./10,298.

✱Itrosyl (T.M. 177631).—A preparation for making Spirit of Nitrous Ether. Dilute the contents of one ampoule with 19 ounces of 90% Alcohol.

Liquor Ethyl Nitritis. **Solution of Ethyl Nitrite.** (*Off.*).

Dose.—15 to 60 minims (1 to 4 Cc.). Should be directed to be added to a small quantity of water at the time of taking.

A mixture of Absolute Alcohol 95 and Glycerin 5, containing in 100 parts by volume, 3 parts, or not less than 2½ parts by weight of Ethyl Nitrite (obtained by the interaction of alcohol, sodium nitrite, and diluted sulphuric Acid, at a low temperature). Should be stored in small bottles. Sp. Gr. 0·823 to 0·826. We found recently 0·826. It keeps better than the Spirit.

The circulation is distinctly affected by a fraction of a minim yet large quantities do not cause death, *vide* also Nitroglycerin and Sodium Nitrite.—Leech.

Æther Aceticus. **Acetic Ether.** (*Off.*).—Consists principally of Ethyl Acetate $CH_3.COO\ C_2H_5 = 88·084$. Fr. Cx., etc.

Dose.—45 to 60 minims (3 to 4 Cc.) or 15 to 30 minims (1 to 2 Cc.) repeated. Sp. Gr. 0·900 to 0·907. Not less than 90% pure. Boils between 165° and 172° F. (73·9° and 77·8° C.). Was used in preparing Liquor Epispasticus, and is inhaled for laryngeal catarrh, ½ drachm to the pint of warm water.

Soluble in all strengths in Alcohol and Ether, and about 1 in 11 of water.

ÆTHYL CHLORIDUM.

Ethyl Chloridum (*Off.*) $C_2H_5Cl = 64·51$.

Syn. Chloryl Anæsthetic. ✱Kelene (T.M. 173627).

Dose.—A good average for an adult by inhaler is 5 Cc.

Using a Rendle's mask—by the 'open' method which is thought preferable to one involving the breathing and rebreathing from a closed bag of vitiated air, 7 to 8 Cc. are advised as adult dose, 5 Cc. for children of 7 to 12 years. Cyanosis and subsequent discomfort is certainly less. The anæsthesia may be prolonged if desired by removing the mask and spraying further quantity on to the sponge —B.M.J. i./11,1051.

Manufactured by the action of hydrochloric acid on absolute ethyl alcohol. If made (*Off.*) from Industrial Methylated Spirit will contain a small amount of Methyl Chloride. Tested (*Off.*) to contain 99·5% Esters calculated as C_2H_5Cl.

At ordinary temperatures this is gaseous, but condenses into a colourless mobile liquid with a sweetish burning taste. Slightly soluble in water, readily in alcohol. Sp. Gr. 0·920 to 0·960 (U.S. about 0·921) at 0° C. (*Off.*) On account of its low boiling point about 50° F.) and the intense cold produced by evaporation, it is useful for producing local anæsthesia in minor surgical operations, also for allaying the pain of neuralgia. All fat must be removed from the part by washing with soap and then with alcohol or ether before applying. In dental cases the patient is instructed to breathe through the nose during operation, the part is well dried, and other parts protected. Its vapour is inflammable.

For inducing general anæsthesia, it is described as pleasant: is taken readily by children and adults, with few or no after effects. Probably within the limits for which it is intended it is safer than any other anæsthetic excepting nitrous oxide. It has the advantage of requiring no complicated apparatus. A closed mask must not be used. It is quicker in action than ether.

To prolong the anæsthesia induced by ethyl chloride chloroform has been advised as best. Ethyl Chloride (and Ethyl Bromide) are said to stimulate the heart, not to depress it as chloroform does.

Bulbs for general anæsthesia (large spray) contain 3, 5, 7, and 50 Cc. **Tubes** for local use 10, 15, 30 and 50 Cc. with screw or auto-stopper. **Bottles** for local or general anæsthesia 60 and 100 Cc. These 60 Cc. bottles are the most convenient for use. **Metal Cylinders** contain 55 Gm., 110 Gm., 1000 Gm.

Instructions for treatment if dangerous symptoms arise in the administration of—

Ethyl Chloride, or Somnoform.—See that the airway is clear and the clothing loose, and begin artificial respiration at once. Weak ammonia vapour may be held to the nostrils Hot flannels should be placed over the heart, and chest smacked with a towel wetted in cold water. Artificial respiration must be kept up for at least an hour. The patient must be kept warm.

For R.D.H. method proceed as under Chloroform.

For tonsils and adenoids Ethyl Chloride is as safe as Ether. No death from it recorded.—C. B. Dale, B.M.J. ii./19,616.; G. A. H. Barton and others, *ibid*, 690; L.B.C. Trotter entirely disagrees, *ibid*; 'not very safe.'—D. W. Buxton, *ibid*. 725.

The combined use of Ethyl Chloride and Nitrous Oxide has been advocated for dental extractions.—Brit. Dent. Jl. 1903, 615.

Relative safety of; best mixed with air at the end of the inhaler, otherwise danger of giving insufficiently diluted.—L. i./07,1908. For further reference see Edition XVI, page 100.

Combined use of ethyl chloride and ether, 2½ Cc. of ethyl chloride used, then ½ ounce ether in a modified Clover inhaler.—B.M.J. ii./06,1257.

Ringworm well treated by Ethyl Chloride after washing with Sodium Bicarbonate, and Spirit of Ether.—L. i./14,242.

Drifustsol solutions in Ethyl Chloride of various *medicaments*, *e.g.* **Amyl Salicylate, Ethyl Salicylate, Methyl Salicylate** *aa.* 2%, **Cocaine** 1%, **Menthol** 5%, **Benzoic Acid** 2%, **Salicylic Acid** 2%, **Cresol** 2%, **Formaldhyde** 1%, **Guaiacol** 2%, **Iodine** 3%, **Iodoform** 2%, **Naphthol** 2%, **Phenol** 2%, **Resorcin** 2%, **Picric Acid** 2%, **Mercuric Oleate** 1%, for spraying for antirheumatic, anæsthetic. and antineuralgic effect, for use in skin affections, and **Pyridine** 2% for inhalation. The spray is used at not less than 65° F. (18° C.) at a distance of 2 foot and deposits the medicament in a fine dry adherent powder or coating on the skin.

Warts well treated with applications of Ethyl Chloride—one application is sufficient if small, and for large warts at intervals of a week.—Pres. Dic. 1911,302.

✱ **Anestile** (T.M.248556) *for Local Anœsthesia*

A mixture of ethyl chloride and methyl chloride evaporates at a lower temperature than the ethyl chloride alone, is quicker and more extended in action

Somnoform is said to be a mixture of Ethyl Chloride 60%, Methyl Chloride 35%, and Ethyl Bromide 5%. 60 Gm. glass tubes with "valve stopper" for inhalation as an anæsthetic in dentistry. **Glass Capsules** contain 3 and 5 Cc.

If **dangerous symptoms** arise in administering proceed as directed under ethyl chloride. In using, respiration must be watched carefully.

Hexachlorethane. $C_2Cl_6=238 \cdot 77$.

In colourless crystals very slightly soluble in water—about 1 in 2,000—more readily in Alcohol or Ether, or a mixture of the two.

This substance may possibly prove of value therapeutically. Physiological experiments gave the following:—The saturated solution had no effect on muscle, hence its toxic effect is considerably less than that of Chloroform (compared per molecule or per weight), with which, of course, it is chemically allied. Rats were fed with butter mixed with the crystals—no effect produced after 24 hours.

ÆTHYL IODIDUM.

Ethyl Iodide.—*Syn.* HYDRIODIC ETHER. $C_2H_5I=155 \cdot 97$.

May be obtained by distilling a mixture of alcohol, iodine, and phosphorus. A colourless liquid (but liable to become coloured by setting free iodine). Of a penetrating odour; boils at 148° F., has Sp. Gr. 1·94; is not inflammable. ***Soluble*** 1 in 400 of water, and miscible with alcohol and ether in all proportions.

Uses.—It is useful *inhaled* as an anæsthetic to relieve the dyspnœa of bronchitis. As it contains four-fifths of its weight of iodine, it forms a rapid means of saturating the system with this element; iodine can be detected in the urine 10 minutes after inhalation, and as long as 30 hours after; it neither impairs appetite nor weakens digestion.

In bronchial catarrh it induces sleep and promotes expectoration when inhaled. It is useful for inhalation in œdema of the glottis from catarrhal laryngitis. It acts as an antispasmodic in spasmodic asthma and certain forms of nervous dyspnœa.

In all spasmodic affections such as angina pectoris and spasmodic asthma one of the best remedies.—L. ii./08,1132; B.M.J. i./09,994.

Internally Ethyl Iodide is found useful in bronchitis, asthma, rheumatism, and for secondary syphilis.

Externally 10 to 20% ointment with paraffin basis may be used (stronger may blister).

General iodization may be produced by painting the iodide on the calf of the leg or between the shoulders, and covering with impermeable dressing. The system may be saturated with Iodine in this way.—Whitla. In angina pectoris, inhalation of Ethyl Iodide useful, action thought to be due to liberation of free iodine which is rapidly absorbed by the blood.—Yeo.

Ethyl Iodide Sterules.

Encased in cotton wool and silk, containing 5 minims in each. The sterule is snapped, the fluid absorbed by the wool, etc., and inhaled for four or five minutes. This may be repeated three or four times a day. The patient requires no assistance, and can take one of the sterules from the bedside, in the dark if necessary.

In whooping-cough exceedingly useful—the coughing fits are rapidly reduced.—Pr. Sept. 1907, p. 439.

Ⓟ**Ethyl Iodide and Chloroform Sterules** contain 5 minims of Ethyl Iodide and 10 minims of Chloroform, and are of the greatest service in the relief of asthma and whooping-cough.

Ⓟ**Ethyl Iodide, Chloroform and Menthol Sterules** as the last mentioned, with Menthol 1 grain in addition, are also made for use in bronchial affections.

Methyl Iodide. $CH_3I=141{\cdot}949$.

A colourless liquid (when first made) boiling at 44° C. Sp. Gr. 2·285. As a vesicant is even more powerful than Cantharides.

Blisters may be produced in a few hours by rubbing in 15 to 20 drops.

ALCOHOL.

$C_2H_5OH=46{\cdot}058$.

Alcohol Absolutum (*Off.*). **U.S., Ph. Ned.,** FR. CX.
Syn. ETHYLIC ALCOHOL, B.P. 1885.

Ethyl hydroxide, with not more than 1% by weight of water. Sp. Gr. 0·794 to 0·7969 representing 99·95% by volume and by weight to 99·4% by volume or 99% by weight.

FR. CX.—Sp. Gr. must not exceed 0·79683 at 15° C.

Alcohol (90% by vol.), (*Off.*). *Syn.* **Spiritus Rectificatus.** SPIRITUS VINI. **P. Austr.** 'SPIRITUS,' **Ph. Ned.**

Contains 90% by volume, or 85·68% by weight, of Ethyl Hydroxide Sp. Gr. 0·8337. Strength 57·80° O.P. (*i.e.*, 100 volumes contain the same quantity approximately of Ethyl Hydroxide as 157·8 volumes of proof spirit). It is generally manufactured commercially of higher alcoholic strength, *i.e.*, about 70° O.P., Sp. Gr. 0·809, containing nearly 95% by weight of Ethyl Hydroxide, and is diluted as required.

'Alcohol,' U.S. has Sp. Gr. 0·816 at 15·56° C. (0·809 at 25° C.), and contains 94·9% by volume (92·3% by weight) of Ethyl Hydroxide. Alcool Ordinaire (officinal) FR. CX. has Sp. Gr. 0·81602 at 15° C., and contains approx. 95% by volume (92·43 by weight).

Diluted Alcohol (*Off.*). *Syn.* **Alcohol Dilutum.**

Including Alcohol (90%)—see above—there are official five strengths, or "several degrees of dilution," of Ethylic Alcohol, four of which are directed to be prepared from the Alcohol (90%), and contain respectively 70, 60, 45, and 20% by volume of Ethyl Hydroxide.

For Alcohol Dilution Tables see Vol. II.

Alcohol Dilutum, U.S. 41·5% Absolute Alcohol by weight (48·9% by volume).

Note.—**U.S. IX.** orders frequently a mixture of 'Alcohol' (94·9% by vol.) 3 parts and water 1 part as menstruum in making tinctures and Fluid-extracts. This is approximately equivalent to 70% by volume.

Spiritus Tenuior, Proof Spirit. B.P. 1885, contained 57% Ethyl Hydroxide by volume=49% by weight. Sp. Gr. 0·920

Prepared by mixing 5 volumes rectified spirit, Sp. Gr. 0·838, with 3 volumes of distilled water, the contraction being about 2·5%.

The greatest contraction occurs when quantities are in the proportion of 3 molecules of water and 1 of alcohol.—Tests, &c.. P.J. i./07,404.

The addition of 100 to the number of degrees "overproof" gives the number of proof gallons, thus 100 gallons of 56 o.p. spirit = 156 proof gallons.

Immature Spirits (Restriction) Act, 1915.

1. (*a*) No British or foreign Spirits shall be delivered for home consumption unless they have been warehoused for at least 3 years:

Provided that—(*b*) This restriction shall not apply (i.) to spirits delivered to a licensed rectifier, to a manufacturing chemist, or to a manufacturer of perfumes or to other persons licensed by Customs & Excise (ii.) to spirits delivered for scientific purposes.

2. Nothing in this section of the Act shall interfere with the supply of Rectified Spirits of Wine for the purpose of making medicines to registered medical practitioners, to hospitals and to persons and firms and bodies Corporate entitled to carry on the business of Chemist and Druggist.

Excise Duty on spirit was advanced in 1909 by 3/9 per proof gallon; it was previously 11/- per proof gallon. Up to 1914 it remained the same, 14/9. At the time of going to press (1920[*]) the total duty was 31/6 per proof gallon on immature Spirit bought between April 23/18 and April 30/19, and 51/6 on Spirit bought after May 1/19. *Rebate* is recoverable of 16/9 per proof gallon (£1/6/6 per gallon S.V.R. 58 o.p.) in respect of the earlier purchases, and 36/9 (=£2/18/0 per gallon S.V.R. 58 o.p.) in respect of the latter, providing full record is produced as required by the Customs Authorities.

A *Stock Book* has to be kept for obtaining rebate (a well-arranged one is issued by Messrs. Fletcher, Fletcher & Co., Holloway), showing the date, bulk quantity, strength and proof quality of each consignment of spirit received and the details of use.

The Rebate concerns purely medicinal preparations, and is not allowed on Tincture of Orange, Spirit of Peppermint, Mouth washes and the like. (*See also* Finance Acts, 1918 and 1919.)

F. C. J. Bird has issued a set of Tables (C.D. Dec. 27, 19) for making the claims for repayment in question. Quantities must be expressed in bulk gallons to the third place of decimals, and all strengths used are to be expressed in "proof." The following taken from the paper are useful:—

Proof Spirit Conversion Factors.

METRIC MEASURE.

Litres to Gallons—multiply by 0.2199.

To express:—

Litres of	90%	Alcohol B.P. in PROOF GALLONS..	Multiply by	0·3471
,,	70%	,, ,, ,, ..	,,	0·2697
,,	60%	,, ,, ,, ..	,,	0·2312
	45%	,, ,, ,, ..	,,	0·1733
	20%	,, ,, ,, ..		0·0767

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[*] By the 1920 Budget a *further* advance on these figures of 22/6 per proof gallon is imposed but freedom from the increased duties is allowed to spirits used for medical and scientific purposes. *See* Finance Bill, 1920, (abst. C.D. May 15, 20).

IMPERIAL MEASURE.

Gallons	90%	Alcohol B.P.	in PROOF	GALLONS	..	Multiply by	1·5779
,,	70%	,,	,,	,,	..	,,	1·2263
,,	60%	,,	,,	,,	..	,,	1·051
,,	45%	,,	,,	,,	..	,,	0·7877
,,	20%	,,	,,	,,	..	,,	0·3487
Pints	90%	,,	,,	,,	..	,,	0·1972
,,	70%	,,		,,	..	,,	0·1533
,,	60%	,,	,,	,,	..	,,	0·1314
,,	45%	,,	,,	,,	..	,,	0·0984
,,	20%	,,		,,	..	,,	0·0436
Ounces	90%	,,		,,	..	,,	0·00986
,,	70%	,,	,,	,,	..	,,	0·00766
,,	60%	,,	,,	,,	..	,,	0·00656
,,	45%	,,	,,	,,	..	,,	0·00492
,,	20%	,,	,,	,,	..	,,	0·00218
Drachms	90%	,,	,,	,,	..	,,	0·001233
,,	70%	,,		,,	..	,,	0·000958
,,	60%	,,	,,	,,	..	,,	0·00082
,,	45%	,,	,,	,,	..	,,	0·000615
,,	20%		,,	,,	..	,,	0·000272

GENERAL REFERENCES TO TREATMENT, ETC., WITH ALCOHOL

Alcohol strengthens no one, it only deadens the sense of weariness. —L. i./06,97. As therapeutic agent.—B.M.J. ii./05,4 : i./09,265

1½ ounces of pure alcohol is all that can be utilised as a food in the human body per diem=3 ounces of brandy and whisky=7 ounces sherry=15 ounces champagne, claret and white wines.—L. ii./04, 1132,1437.

Even in small quantities is injurious to the proper working of the brain (Victor Horsley).—B.M.J. ii./05,1656.

Physiologically it is narcotic and antipyretic, not stimulant.—Pharmacol.

In favour of Alcohol in moderation. The 'power of unlocking energy exerted by Alcohol' is one of the themes.—Charles Mercier, L. ii./12,1492.

90% of the crime of this country depends upon intemperance.—Lord Alverstone, L. i./13,197. See also German Anti-Alcohol Association.—L. i./13,1351,1503 ; U.S.A. particulars.—B.M.J. ii./12, 1557 ; Sweden's Gothenburg System.—ii./13,1107.

Fatigue and alcohol. Review of labour conditions in various trades. Effects of alcohol worse than useless.—A. F. S. Kent, L. ii./17,107.

Alcohol and Arteriosclerosis.—The majority of clinical observers assume that excess in alcohol raises blood pressure and hence predisposes to arteriosclerosis, but the pharmacological action of Alcohol is complex,—while it increases force and frequency of the heart's beat it relaxes the peripheral arterioles. There are stages of intoxication in which vascular stress is doubtless increased, but this is by no means the universal effect of Alcohol. It is argued, and this also refers to tobacco smoking, that it is the sudden changes in blood pressure induced by the drugs in question, which exert the stresses leading to arterial damage, and it is possible that the argument is a good one. The registered cause of about 1/3rd of the total deaths in the age period 55 to 65 was disease of the heart and blood vessels.—F. W. Andrews, L.G.B. Rept. per P.J. ii./12,739.

Herpes zoster relieved by Alcohol.—B.M.J.E. ii./01,12.

Champagne injections in Surgical Shock. Transfer contents of a small bottle (about 400 Gm.) into an ordinary 500 Gm. serum bottle and add Normal Saline 100 Cc. Inject subcutaneously in the normal manner and repeat in six hours if necessary. If a prompt evacuation of the bowels is required give an injection of Pituitary Extract and if necessary repeat in three hours. The combination is recommended. Valuable diffusible stimulant in certain cases of pneumonia, influenza, etc.—L. i./13,1416.

Alcohol Injection in Neuralgia (Schlosser's Method).—

Intractable trigeminal neuralgia or tic doloureux treated by Alcohol injections, (80% usually employed) around the supraorbital notch. 112 cases. Give Hyoscine 1/150 grain and Morphine ⅓ grain 20 minutes in advance. Prior to the Alcohol a few drops of 3½% Eucaine to assist in locating the nerve trunks.—W. Harris, L. i./13,881.

Epileptiform neuralgia cured by injections of Eucaine in 2 Cc. of 80% Alcohol.—L. i./11,507. See also B.M.J. ii./10, 1051, L./12, 218.

Dysphagia of laryngeal tuberculosis treated by injections into the sensory nerve of the larynx of 1 Cc. of 80% Alcohol containing 2 grains of β. Eucaine Hydrochloride per ounce. Details of six cases are given in which injection gave relief.—L. i./10,1754.

Acute forms of inflammation of the womb and ovaries and general inflammatory conditions of the female genital organs, have been well treated by abdominal compresses, first of alcohol 60% strength, and afterwards with 90%, together with vaginal tampon 30% strength.—M.A., 04,5.

In pneumonia the routine use of alcohol especially in early stage with idea of preventing cardiac failure is a serious error.—Yeo.

For dietetic use the alcohol from grapes is purest; from corn is next best; from beetroot may be impure; and from potato the most dangerous.—W. W. W.

Sterilise substances insoluble or only slightly soluble in alcohol with it.—Charles Wray. B.M.J. ii./08,862.

Typhoid (especially of children) has been treated by compresses of Alcohol by means of a layer of absorbent cotton or folded gauze large enough to cover the abdomen entirely, these are covered with a compress of cold water with impermeable tissue above. The water is renewed hourly—the alcohol is left several hours. Skin irritation to be relieved by Lanolin.—Pres 1910,127.

In skin affections, especially syphilis, acne rosacea, psoriasis, erythema, and angio-neurotic oedema. Used internally often very pernicious, locally often useful.—M.A. 1911,577.

Moderate doses of alcohol may help the digestive process by increasing the activity of the gastric movements and promoting absorption (*c.f.* our Pepsin experiments, *Vol. II.*). It also increases the rapidity of absorption of potassium iodide. Neither the intake of oxygen nor the output of carbonic acid gas is altered by alcohol, therefore as it has been oxidised in the body it saves tissue and is a food.—Hale White.

It is in condition just short of health—in old age, over work and fatigue—that the beneficial effects of alcohol become most marked. The moderate use of alcohol in health is harmless, if not indeed actually beneficial. The effect of wines on pancreatic digestion is akin to their action in the mouth (*i.e.* retarding the conversion of starch), and may be entirely explained by their acid qualities (out of all proportion to their alcoholic content), but by the increase of appetite and gastric secretion which they induce, they may, in moderate quantity at least, not only neutralize any inhibition of the merely chemical processes which they exert, but actually render digestion quicker and easier than it otherwise would be. This, indeed, is one of the most useful actions of wines both in health and disease.—Hutchison.

Alcohol for Burns.—If patient is in such a state of shock that he cannot stand an anæsthetic, a Saturated Aqueous Solution of Picric Acid is used on lint,—covered with protective. This is the usual procedure but the Acid may cause toxic symptoms. This worker has not found Picric Acid treatment satisfactory. It is better to cleanse the burns with Alcohol (70%) under Chloroform anæsthesia. The whole surface of the burn and surrounding skin is rubbed vigorously with the dressing. Blisters are rubbed off with all dead tissue (better than using scissors and forceps). After cleansing, a dressing of sterile gauze wrung out of the Alcohol is applied, over this dry gauze and wool. Similar process repeated. For further details see L. i./13,705.

Spirit–Glycerin.—For Wounds Spirit and Glycerin alone or charged with antiseptics, *e.g.* Biniodide Spirit, Glycerin and Ichthyol act like hypertonic saline in producing free discharge and require frequent changing. Not so painful as Iodine.—A. Don, B.M.J. i./16,648.

Alcoholism, Acute, Treatment of, *see* **Poisons and Antidotes.**

References to Treatment of Inebriety.

" Drunkenness often chooses for its victims not the men and women originally the worst, but persons of strong social susceptibility and open in special respects to temptation."—Gladstone at Liverpool, 1893.—B.M.J. i./11,515.

Habitual Inebriety is an evidence of an unsound mind rather than a cause of it.—C.D. ii./13,1259.

Multiple neuritis is commonly caused (directly or indirectly) by Alcohol whether in beer or spirits. In 1900 peripheral neuritis was attributed to the Arsenic in beer. The percentage of cases in Manchester (where the trouble started) has since been almost identical with that before, whilst during the epidemic the percentage was about four times as great.—B.M.J. ii./09,1025. Pure alcoholic neuritis may exist, but as a rule not severe in degree.—B.M.J ii./09,1257

The majority of insane inebriates have become alcoholics because of congenital defects or tendency to insanity, not insane as a result of alcoholism Alcohol, more of a coefficient than an actual cause of insanity,—this is, however, disputed by others who say that Alcohol is the direct cause in a large proportion of cases.—B.M.J. i./11,1383.

Numerous other references in our last Edition, page 106.

Pharmacology of Alcohol—best looked upon as a drug.—R. B. Wild.—L. ii./18,623.

Differential diagnosis of alcoholic coma from other forms of coma.—M.P.C. ii./11,420.

Ammonium Chloride in doses of 30–60 grains with copious draughts of water is a suitable antidote to alcohol. The administration of smaller doses may be continued. It prevents the effects of alcohol, sobers the patient quickly and is a valuable preventive against delirium tremens.—P.J. ii./11,880.

For **McBride's treatment,** *see* p. 211.

For the " **Normyl Treatment,**" *see Vol. II.*

Alcoholism, Acute, Treatment of, *see* **Poisons and Antidotes.**

Spiritus Vini Gallici.

Brandy. Contains 40 to 50% (or 60% in case of good Cognac) by volume of alcohol. Contains 0·6 to 1·2% Extractive, 0·3 to 0·8% sugar, 0·08% compound ethers and yields 0·01 to 0·02% ash.

An ounce of brandy yields 100 calories of energy.—Hale White.—*c.f.* Nutrimenta.

Brandy Sterules, Hypodermic. Convenient for the emergency bag. Contain 1 drachm.—L. i./05,1583.

Spiritus Frumenti. Whisky prepared by distillation of fermented grain—barley, wheat, rye, Indian corn. Sp. Gr. is usually about 0·925, contains 37 to 47% by weight (44 to 45% by volume) of alcohol.

Regulations by Ministry of Food:

At the time of writing, no potable spirits may be sold (retail) at a higher strength than 30° u.p. (= 40% by vol. approx.) Whisky may be sold at lower strength but it must be stated so on the bottle and at a proportionate reduction in price. With regard to Brandy there is no control on the prices.

For Amounts of Alcohol in various Wines and Spirits see Vol. II.

Eau de Paris. *Syn.* **Spiritus Coloniensis.**

Oil of Bergamot 20, Oil of Lemon 20, Tincture of Musk (1 in 50 Alc. 45%) 5, Oil of Neroli 2, Oil of Cinnamon 1, Oil of Cloves 1, Oil of Rose 1, Alcohol (90%) 1,800 Distilled Water 150 (all by weight). Macerate for 8 days, and filter.

Spiritus Myrciæ, Bay Rum, U.S., 1890.

Oil of *Myrcia acris* (*Myrtaceæ*) 16, Oil of Orange Peel 1, Oil of Pimento 1, Alcohol (94%) 1,220. Mix, and add gradually Water to 2,000. After 8 days filter. Of considerable renown as a **Hair Lotion.**

Another formula is :—Oil of Bay 5, Oil of Pimento 1, Oil of Orange 1, dissolved in Alcohol 400 then add West India Rum 200 and Water 400. History of Bay Rum.—P.J. i./11,655.

Aqua Mellis, Honey Water.

Yellow Sandal Wood, in shavings, 16, Alcohol (90%) 640. Macerate 7 days, and pour off the alcohol. Add to the marc, Concentrated Rose and Orange Flower Waters, of each 160, shake well, decant, and add to the alcohol set aside. To this mixture add English Oil of Lavender, Oil of Cloves, of each 2, Oil of Bergamot 1, Oil of Nutmeg, Oil of Sandal, of each $\frac{1}{6}$.

Alcohol Allylicum, $CH_2:CH.CH_2.OH=58·063$.

A colourless liquid miscible with water, with a pungent odour and burning taste. It inhibits bacterial growth. Investigation of Allyl Compounds. *c.f.* Sinapis Chapter and Oleum Allii.

Alcohol Amylicum. (*Off.*). $C_5H_{11}.OH=88·111$.

Consists principally of iso-primary amylic alcohol. $(CH_3)_2CH—CH_2—CH_2.OH$.

It is prepared by purifying and fractionating fusel oil, collecting that distilling between 257° and 289° F. (125° to 143° C.). Closer range of boiling points has been recommended. If B pt. 128°—130° C. Sp. Gr. is commercially about 0·833 at 15° C.

Alcohol Methylicum, $CH_3.OH=32·037$. **Pyroxylic Spirit**

Dose.—30 to 60 minims (**2 to 4 Cc.**).

If absolute and "acetone-free" has Sp. Gr. 0·796. but is not allowed by the Excise to be retailed pure unless duty-paid. Has been used internally for vomiting of pregnancy, sometimes combined with menthol. The commercial substance known as **Wood Naphtha**, or **Wood Spirit**, is 60 to 90% pure and contains acetone and other empyreumatic impurities. A purer preparation used in the arts has Sp. Gr. 0·81. It is a solvent of pyroxylin. The Methylated Spirit licence is not necessary for the sale of Wood Spirit, but that licence does not, of course, cover the sale of pure Methyl Alcohol.

May cause optic atrophy, and so blindness, if drunk, or if too much be inhaled at work.—B.M.J. i./04,151; L. ii./04,1255; B.M.J. ii./06,1855.

The lethal dose is said to be between 50 and 100 Gm. Blindness may follow doses of even 7 or 8 Gm.—M. XXVI. (1912), p. 87, but the toxic dose is much less.

For Detection of in Ethyl Alcohol, etc., see Vol. II.

Spiritus Methylatus, Mineralised or Denaturalised.

A mixture of rectified spirit with wood naphtha, containing 10% by volume of the latter, with in addition $\frac{3}{8}$% (=0·375%) by volume of Mineral Naphtha (Petroleum Oil) of Sp. Gr. not less than 0·8; has Sp. Gr. 0·827 to 0·828, and forms an opaque mixture with water.

During the War (as from June 1st, 1918), the component parts of **Mineralised Methylated Spirit** were altered to 95% Spirits, 5% Wood Naphtha, $\frac{1}{2}$% Mineral Naphtha with 0·025 of an ounce of Aniline Dye (Methyl Violet) for each 100 gallons of Spirits. The composition of **Industrial Methylated Spirits** was for "**Ordinary**" 97$\frac{1}{2}$% of Spirits, 2% Wood Naphtha and $\frac{1}{2}$% Mineral Naphtha, and for "**Special**," 97% Spirits and 3% Wood Naphtha These provisions were temporary only and are now cancelled.

The use of Methylated Spirits in the preparation of any article capable of being used internally as a medicine or wholly or partially as a beverage is forbidden. Its use is permitted by general order of the Board of Customs and Excise in making Linimentum Saponis, Compound Camphor Liniment, and Aconite and Belladonna Liniments.

Duty free (plain) Spirit can only be obtained by Universities and similar Training Institutes and by Manufacturers of certain chemicals and substances for which Methylated Spirits are proved to be detrimental. The question of increased cost in manipulation has no weight in the eyes of the Board of Customs and Excise.

Industrial Methylated Spirit was introduced by the provision of the Revenue Act, 1906. This is simply a mixture of plain 'Spirits' with one-nineteenth of its bulk (5% of its volume) of Wood Naphtha (Methyl Alcohol), and is obviously considerably purer and of greater utility for manufacturing purposes. The Mineralised Methylated Spirit is retained, but the old name 'ordinary' Methylated Spirit should be dropped as the **Industrial Methylated Spirit** has taken its place. **Industrial Methylated Spirit** can only be used by a Manufacturer on giving a Bond, *i.e.*, if, as would probably be the case, more than 50 gallons per annum is used—less than 50 gallons do not necessitate a Bond.

The Act provides for the use of Industrial Alcohol in the composition of Soaps, Compound Camphor, Aconite and Belladonna Liniments of the B.P. It is less irritating than the old Ordinary Methylated Spirit. The Board allows *these liniments* but not *the indiscriminate use* of the Industrial Spirit.

No person may receive it without the authority of the Board. It *may in no circumstances be used* for any purpose *except those for which the Commissioners* have specifically authorised *the user to employ it.*

The regulations governing the use of Industrial Spirit are prescribed by the Commissioners of Inland Revenue under Authority of the Spirits Acts, 1880. Iodine in Industrial Spirit not permitted.—B.M.J. i./14,1200.

"*It is illegal to dispense the Industrial Spirit even on a doctor's prescription,*" *e.g.*, for a cooling skin lotion.—Disp.

With regard to the use of Mineralised Methylated Spirit in Medical prescriptions the following is of importance:—

A prescription for a lotion of Soft Soap and Methylated Spirit, also a lotion containing Sublimate and Methylated Spirit were submitted to the Board of Customs and Excise, with the question whether Mineralised Methylated Spirit could be used. The reply stated that a chemist can make up at his own risk a prescription with Methylated Spirit which he considers incapable of internal use as a medicine and which, for lack of time, cannot be submitted for approval of the Commissioners, but general permission for the use of Methylated Spirit in making them could not be granted. It must be understood this remark applies to Mineralised Methylated Spirit.—P.J. i./11,118.

Not more than 4 gallons of methylated spirit may be sold to any one person at one time on one day, and not more than 200 gallons may be kept in stock by licensed retailers, nor may it be sold between the hours of 10 p.m. on Saturday and 8 a.m on Monday.

Industrial Methylated Spirit. *Amounts used* in the United Kingdom during the years ending March 31st, 1913 and 1914 : For Ether making 198,000 gallons and 230,000 gallons, for Chloroform 5,000 and 3,000 gallons, for Alkaloids and Chemicals 32,000 and 37,000 gallons, for Varnishes 980,000 and 1,100,000 gallons approximately respectively.—P.J., i./15,698.

"**Power-Methylated Spirits**" is introduced in the Finance Bill, 1920.

Duty Free Alcohol, other than Mineralised and Industrial Methylated Spirit, is obtainable by permission of the Commissioners for use in any art or manufacture in which the spirit is required and where it is proved to their satisfaction that Methylated Spirit is unsuitable or detrimental. A bond must be given and the *attendance of a Revenue officer* to witness the denaturing of such supplies is requisite.—Board of Customs and Excise, per P.J. i./15,34. *See also* P.J. ii./14,316,339.

to 1 of Water) is used for sterilising the skin and instruments.

Denaturalised spirit in Germany contains 2½% of a mixture of wood spirit 80 parts, pyridine bases 20 parts.

U.S. gives a method of detecting Methyl Alcohol.

Alcohol 75% (about 5 volumes of 90%, or of Methylated Spirit,

Lotio Evaporans, St. M.'s H. Methylated Spirit 1 drachm, Solution of Ammonium Acetate 1 drachm, Water to 1 ounce.

Antidotes.—In America poisoning by so-called deodorised spirit is common. In acute poisoning treat by rectal injections and stomach pump.—Give brandy, strychnine or coffee.

Further, for the subsequent amaurosis give pilocarpine and potassium iodide, and later strychnine hypodermically or *per os*.

Treatment : Pilocarpine sweats with Potassium Iodide or Sodium Salicylate in the early stages and full doses of Strychnine hypodermically when optic atrophy sets in.—B.M.J. ii./06,1855.

ALDEHYDA.

Aldehydum Absolutum. *Syn.* **Acetaldehyde**

$CH_3.COH.=44·042.$

A colourless mobile liquid, irritating when inhaled. Sp Gr. 0·7876 at 16° C B.Pt. 21° C. Becomes acid on keeping exposed to air—oxidation to acetic acid. Polymerises with rapidity in presence of sulphuric acid at atmospheric temperature into paraldehyde (*vide infra*), but if temperature be below 0° C. crystalline **metaldehyde** is formed.

Aldehydum Dilutum.

Contains 15% in Alcohol, is neutral to test paper, and has an ethereal suffocating odour, producing spasm of the glottis when respired. Diluted 1 in 1000 with water at 140° F has been used as inhalation in catarrh and ozœna

Paraldehydum $(CH_3.COH)_3=132·126.$ (*Off.*). **U.S.**

Dose.—30 to 120 minims (**2 to 8 Cc.**), or more, in diluted syrup or almond mixture, repeated if needed in ½ an hour. (In the knowledge of the writers ½ ounce has been given—this is probably a maximum single dose.)

A colourless liquid crystallizing below 50° F.; Sp. Gr. 0·998, may be obtained by treating Aldehyde with dilute sulphuric acid. ***Soluble*** 1 in 10 of water and in all proportions in alcohol 90%.

Uses.—As a sedative, resembling Chloral, but without action on the heart. In spasmodic asthma it relieves spasm and induces sleep. Intravenously it is an Anæsthetic and Hypnotic. *v. infra.*

Flavoring.—Prescribed as Elixir or Mistura Paraldehydi *q v.* Extractum Glycyrrhizæ Liquidum covers the taste.

Elixir Paraldehydi.

Dose.—1 to 3 drachms (**4 to 12 Cc.**).

Paraldehyde 240, Glycerin 240, Alcohol (90%) 480, Oil of Cinnamon 4, Oil of Bitter Orange 8, Saccharin 1.

Strictly speaking, however, alcohol is physiologically incompatible with paraldehyde.

Mistura Paraldehydi.

Paraldehyde 2 drachms, Essential Oil of Almonds (*sine* Acid. Hydrocyanic) 3 minims, Syrup 1 ounce, Liquid Extract of Liquorice 2 drachms, Water to 4 ounces. This covers the nauseous taste to some extent and forms four doses of ½-drachm or two doses of 1 drachm. The following are preferable :—

Paraldehyde Capsules, 20, 30 and 40 minims.

Dose.—1 or more.

Paraldehyde is diuretic but does not affect the skin, nor give rise to digestive disturbances or headache. Is satisfactory as an enema.

Occasionally it produces slight excitement and vomiting.

A case is recorded of three and a half ounces taken in error; 9 hours afterwards strychnine hypodermically and ammonia applied and injected, recovered consciousness in 34 hours. Two ounces have proved fatal.—W. W. W.

In delirium tremens the safest hypnotic is paraldehyde in doses of 100 minims.—Whitla, Pract. Med.

Mistura Paraldehydi et Potassii Iodidi.

Dose.—1 drachm (4 Cc.).

Paraldehyde 1·25, Potassium Iodide 0·92, Liquid Extract of Liquorice 6·25, Water to 100.

In broncho-pneumonia and capillary bronchitis of infants valuable. The constituents of the mixture are incompatible, free Iodine being formed but not sufficient to harm. In severe cases the secretions dry up remarkably.—B.M.J. i./08,258.

Intravenously as Anæsthetic.—Deep anæsthesia can be very rapidly produced,—hypnotic effect is excellent. It is well to give with an equal amount of Ether. The action of the drug is very rapid, hence best given diluted. 5 to 15 Cc. of Paraldehyde is mixed with equal quantity of Ether; this mixture is dissolved in 150 Cc. of cold solution of Sodium Chloride (1%) in sterile water. Inject the solution cold or at not exceeding 25° C. Fildes and McIntosh's Injection Apparatus is used. Five seconds after injection the patient tastes Paraldehyde; in 40 seconds unconsciousness occurs, and in 90 seconds the corneal reflex is absent and anæsthesia complete. By this time 5 to 10 Cc. of Paraldehyde will have been given, and some minor operations may be performed, but as the drug is rapidly excreted by the lungs usually the whole 15 Cc. will be required. The method is practically safe and it has been used in cases of grave cardiac and pulmonary disease with perfect success.—H. L. C. Noel & H. S. Souttar.—L. ii./12,818.

Initially in the method small doses, *e.g.*, 4 Cc. were injected into the median basilic vein. Almost before the syringe is empty the patient is unconscious. Patient slept naturally 2 hours. A 10% Solution in Saline is better than the pure substance. 100 Cc. of this Solution produces in 10 seconds an anæsthesia lasting 20 minutes and suitable for minor surgical work. It is passed off by the lungs (an important element of safety).—H. L. C. Noel, L. ii./12,1221.

Tetanus treated by injecting Paraldehyde and Ether intravenously. Thus given it produces muscular relaxation. Copious injections of Saline Solution were given to assist the elimination of the toxin. First 5 Cc. of Paraldehyde and 5 Cc. of Ether in 150 Cc. of Saline were given. Deep anæsthesia was produced and Normal Saline then given. Finally another 150 Cc. of the above Solution. In all two litres of fluid. Next day 15 Cc. of each in 150 Cc. of Saline were injected and repeated on subsequent days. Ultimately on the eighth day 300 Cc. of the same strength. Some septic tuberculous sinuses which complicated the case healed and the boy was discharged well. The treatment acts both as anæsthetic and hypnotic. One could probably start with the larger doses straight away.—Oliver Atkey, L. i./13,168.

Paraldehyde 1 drachm, Ether 3 drachms, and Liquid Paraffin 4 drachms, given *per os* produced sufficient analgesia to permit of dressing of painful wounds.—J. T. Gwathmey and H. T. Karsner, J.A.M.A., April 6th, 1918; L. i./18,711.

Aldehydum Formicum. H.COH.=30·021.

Formic Aldehyde in vapour is an active antiseptic, preventing decomposition and fermentation, while it is comparatively non-poisonous.

Liquor Formaldehydi. (*Off.*). U.S., P. BELG., FR. CX., P. JAP. *Syn.* FORMALIN, FORMOL, METHANAL, METHYL ALDEHYDE SOLUTION.

PATENT: A patent was granted 7038/1893 for the 40% solution described as a New Antiseptic material. **Expired** 1900.

TRADE MARK: An application to register the word "formalin" was refused in 1900 on the ground that it was the name of the patented article.—C.D.I.

Dose.—1 minim, *internally*, well diluted. *Hypodermically*, *vide* References, *infra*.

It is rarely given internally. Wiley gave 0·1 to 0·2 Gm. daily in an investigation.—*Cf.* Vol. II., *Milk Preservatives.*

An aqueous solution of Formic Aldehyde, containing 36 to 38% *w/v.* Sp. Gr. 1·079 to 1·081. (35% by weight=38% by volume.) Assay method by means of sodium hydroxide and hydrogen peroxide is given—(*Off.*). *c.f.* also Y.B.P., 1902,83; '03,84. P. JAP. has also **Aqua Formalinata** 1 in 35 of the 35% preparation.

Manufacture by oxidation of methyl alcohol.

NOTE :—*Confusion arises with regard to prescriptions for this solution. It is to be understood that a 1% Solution of Formalin means 1% of the Commercial '40%' Formaldehyde Solution. 1% Solution of Formaldehyde means 1% of actual Formaldehyde H.COH.*

Antidotes.—Stomach tube and emetics followed by alkaline drinks, sal volatile (or ammonia in other suitable form), alcohol.

Uses.—For *wound treatment*, and for sterilising surgical instruments, and the hands of operators, *e.g.*, as FORMOSYL, *q.v.* Has been suggested, 1 or 2%, as a pigment and spray for *diphtheria*. Also as Glycerin Pigment 2% to the throat in *angina follicularis*, and as a lotion in *pertussis* 2% or less—with caution. See also Paraform p. 130. As compresses to *malignant tumours* 2% or stronger either as palliative, or prior to removal. For *alopecia* 10% or stronger. For *eye washes* $\frac{1}{20}$% has been employed.

Useful as a preservative for embalming and the preservation of corpses for dissection and for museum specimens generally—dilute about 10 times—to harden about 25 times, but for preservative purposes a far weaker solution is sufficient. It shrivels up soft corns causing them to drop off if applied daily. Under the name of **Durine** a preparation is made for this purpose.

For a common cold inhalation of 1% will cure.

Ophthalmia, trachoma (1 in 2,000 up to 1% used) and *sweating feet* are well treated by a lotion. *Ringworm, lupus, laryngeal growths* by pigment of 1 to 3 glycerin. A spray or douche is useful for *ozœna* (1 in 2,000 up to 1 in 500 with coarse spray). For puerperal fever uterine injection of 1 ounce of glycerin with 3% of Formalin. Also 1 minim doses *per os* have been practised.

Recurrent pleural effusion has been treated by intrapleural injection of Glycerin 1 ounce, containing 10 drops of Formalin.

Eczema in *dry* form should be treated with moist formalin application, *e.g.*, 1 of formalin (40%) in a starch and water jelly 99.

To eczema that is weeping, apply Lysoform or other formalin dusting powder. Staphylococci of eczema are killed by 1% 'Formalin.'—E. Blake.

For Room Disinfection and Utensils (in addition to **sunlight, fresh air and soap and water**) 1 or 2% Formalin as spray (coloured fabrics are not injured), or burn Formalin Disinfecting Tablets, *q.v.* As a wash up to 10% solution may be used. For furniture 1% would be suitable. Or simply *evaporate a pint of Formalin per 1,000 cub. ft. in an open vessel over a bunsen or spirit lamp.*

Fumigators, *e.g.*, "**Lister's,**" are made for room disinfection. They are arranged to be lit at the bottom of the container whilst the fumigator stands on a tray with a little water. Formaldehyde is volatilised into the room and continues to be evolved for ½ hour. Windows, etc., to be pasted down in the usual way where complete disinfection is required, and clothing, etc., left exposed to the vapour for 3 or 4 hours

For the use of **Formalin with Potassium Permanganate** *for Room Disinfection and for purifying utensils, also as Preservative of Foods, also for the Detection in Milk, Urine, etc., and for Method of Determination and its General Antiseptic Power, see Vol. II*

References to Use of Formalin.

Acute endometritis treated by injecting 50% solution of Formalin into the uterus and washing out again quickly. Not so dangerous as Zinc Chloride.—B.M.J. ii./09,1031.

Hydatid cysts of the liver treated by injections of 1% Formalin Solution left *in situ* 5 minutes, then withdrawn.—B.M.J. ii./08,1617.

Pulmonary tuberculosis, 3 cases treated by intravenous injections of Chinosol with Formaldehyde administered by Maguire's Apparatus. 50 Cc. of a 1 in 2,000 solution of Formaldehyde with 1 in 4,000 solution of Chinosol are injected into the median-basilic or median-cephalic vein, this is repeated daily for thirty or more consecutive days; the strength being gradually increased to Formaldehyde, 1 in 500; and to Chinosol, 1 in 1,000. Beyond slight gastric disturbances the patients suffered no inconvenience. The method appears to give a rapid and permanent cure.—L. ii./10,1408.

Formalin as an ingredient of a mouth wash should not exceed ½%.—C.D. i./10,64.

Epithelioma on the face cured by applying Formalin solution after using Cocaine. The treatment is repeated after four days—the scab comes off and the surface below cicatrises rapidly. There is no local reaction, but the method is only suitable for epithelioma not larger than a florin. A solution of 2% Formaldehyde is valuable in extensive and inoperable cases. It causes necrosis and elimination of neoplastic bodies without irritating healthy adjacent tissue or causing pain.—B.M.J.E. ii./10,80. See also B.M.J. i./09, 532.

The strong preparation is also valuable in treating aphthous ulcerations of the buccal mucous membrane—the part is washed with a tampon soaked in it. *Use Cocaine first.*

Ringworm can be cured by painting with a soft camel's hairbrush with Formalin, meanwhile keeping the patch of skin in such a position that the solution will not run off it. One painting usually suffices. If skin greasy wash with Spirit first. May smart a little but otherwise rapid, clean and effective. Second application may be repeated in five days' time.—L. ii./10,130.

In operating on tuberculous joints "5% Formalin" often gives good results when septic infection has occurred—the sinus, after scraping, is plugged with gauze soaked in the diluted Formalin—this is assumed to agree with our definition of 'Formalin.'—B.M.J. i./12.18.

Keloid growing in the jewel holes in the tip of the ear treated by injection of Formalin,—5 minim doses. A number of these doses may be required according to size. Painful. Local anæsthetic or Chloroform is required. B.M.J. ii./13,811.

Formaldehyde Poisoning by drinking 3 ounces of 4% Formaldehyde. Unconsciousness occurred in three minutes. Treatment consisted in washing out the stomach with strong Saline Solution and later with Solution of Ammonium Acetate. At the post mortem examination it was found that the interior of the œsophagus and stomach was extremely corroded.—B.M.J. ii./12,1470.

Several other cases of Formaldehyde poisoning are reported.—B.M.J. ii./12,350.

Preparations of Formaldehyde

Collutorium Formalini, R.D.H.

Formalin 18 minims, Peppermint Oil 5 minims, Alcohol (90%) 1½ drachms, Peppermint Water to 1 ounce. A few drops to ½ tumbler of water for use.

Gargarisma Formaldehydi.

Formalin Solution 1 minim to Water 1 ounce.

Nebula Formaldehydi.—C. Muthu's Inhalants.

Inhalant "A."—Chloroform 1 drachm, Menthol 10 grains, Pumilio Pine Oil 10 minims, Alcohol (90%) to 1 ounce, with 2½% Formaldehyde (in the form of gas).

Inhalant "B."—Guaiacol 1 drachm, Chloroform 1 drachm, Menthol 15 grains, Pumilio Pine Oil 15 minims, Alcohol (90%) to 1 ounce with 5% Formaldehyde.

Inhalant "C."—Guaiacol 2 drachms, Chloroform 2 drachms, Menthol 15 grains, Pumilio Pine Oil 15 minims, Terebene 1 drachm, Alcohol (90%) to 1 ounce.

Inhalant "D."—Guaiacol 2 drachms, Iodine 1 drachm, Terebene 1 drachm, Pumilio Pine Oil 15 minims, Chloroform 2 drachms, Alcohol to 1 ounce.

Dose.—About 10 drops of one of the above sprinkled on the inhaler every half to one hour, and used by continuous inhalation.

These inhalations are used progressively. After reaching "C," "D" is used as an alternate Solution or for night use.

Where Formaldehyde is not tolerated or where there is nasal trouble "C" and "D" are tried from the beginning.—C. Muthu, B.M.J. ii./11,671 ; ii./13,669.

During the period 1910–1911, about 50% of patients recovered under the treatment. Inhalants as above.—Pr., January, 13,134.

Strengths of Formalin admissible for Inhalation.

It is probable that the reason why a preparation on these lines has not been more largely used is that the 'Formalin' has not been sufficiently diluted for general use by various patients,—pain and suffering may be produced. We recently instituted a few experiments on a normal individual, and found as follows :—

A plain 1% mixture of Commercial Formalin in 90% Alcohol (*i.e.* without Chloroform, etc.) could be tolerated without it being too irritating to the throat and nostrils.

A 5% mixture was too irritating for prolonged use by inhalation.

A 10% mixture was out of the question.

All the above were tried in an ordinary Burney Yeo Inhaler.

For phthisical treatment it has been suggested to us by another worker to employ the following **Formalin and Chloroform Solutions** :—

No. 1. Formalin 5, Chloroform 15, Alcohol (90%) 80.

No. 2. Formalin 10, Chloroform 20, Alcohol (90%) 70.

Our informant writes, "No. 2 is only ventured upon where Formalin is well and easily endured. In the absence of the anæsthetic effect of the Chloroform patients were not able to bear even the mild preparation for any length of time. Results very encouraging."—H. Collier.

In one instance—a young man, aet. 22, with general consolidation of the upper right lobe, where the temperature was nightly 103·4°, 103·6°, 103·8° or 104° F., under the treatment showed a fall to 100° F. in a week, and subsequently lower. Simultaneously general health and strength improved. Now taking daily exercise and has gained 11 lbs. in weight.

Formanilid. $C_6H_5NH.COH = 121·101$. *Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**) Hypodermically 15 minims (**1 Cc.**) of 3% solution. Yellowish crystals soluble in water and alcohol, melting at 46° C. Employed in hæmorrhage and fevers. 20% solution said to produce local anæsthesia in 1 hour. 2 to 3% for urethral discharge.—M. Am., 1907. To be distinguished from Formamid, $HCO.NH_2$.

* **Formosyl** (T.M. 293326) [***Lysoform** (PATENT 7616/1900 now expired; TRADE MARK 230544) is a similar preparation].—This preparation is a liquid formaldehyde potash soap. It is highly antiseptic, relatively non-poisonous, inodorous, deodorant and cheap; does not coagulate albumin, and is miscible with water and alcohol in all proportions. It combines the penetrating lathering action of soap with the antiseptic power of Formalin. A 5% solution is rapidly fatal to *B. typhi abdominalis*, *B. coli communis*, and the *Staphylococcus pyogenes aureus*, and a 3% solution destroys *B. anthracis* spores in 24 hours. A 2% solution is sufficient for general purposes and is better freshly prepared. For hand disinfection 1 to 2% is suitable. The stock bottles should be kept well corked. *Uses.*—In using warm solutions a temperature of 40° to 50° C. should not be exceeded; ½ to 1% is suitable for irrigation of the vagina, uterus, abscess cavities, &c. Diluted it is useful for psoriasis, lupus, eczema, and as a wash for perspiring feet. Impetigo may be treated with 5% **ointment** combined with carbolic acid and ammoniated mercury, or same strength with zinc ointment (paraffin basis) for eczema. 25 to 50% ointments with lanolin basis are applied to ringworm and alopecia areata. A 10% **ointment** is used in psoriasis. 20 to 30% may be used to arrest sweating of the feet where of limited area. For seborrhœa a 10% ointment with 5% resorcin is useful. 10 to 15% in gall ointment is suitable for piles. **Formosyl Mouth Wash, Tooth Paste, Tooth Powder, Dusting Powder,** for moist surfaces, bed sores and syphylitic ulcers, and **Toilet Soap** are prepared, also **Pessaries** of Cacao Butter, containing 2 grains each. In the sick room and operating theatre its deodorant properties will be evident. It cleanses suppurating wounds and has styptic action on bleeding surfaces. Two to 5% is also suitable for bites, stings and burns. It is valuable also for general household disinfection, for deodorisation and cleaning. Good results have been obtained with it in veterinary use.

Formosyl Mouth Wash. An efficient antiseptic. A small teaspoonful is added to the tumbler of water and used in the customary manner. Agreeably flavoured.

Dermatologists who treat the skin with lotions and ointments and leave the state of the mouth unattended to, are proceeding on the most unscientific lines. Eruptions on the head and face are frequently found in conjunction with an unhealthy condition of the teeth and gums.—L. i./11,1206.

✱**Formosyl Gargle.**

This preparation contains Formalin, Phenol, Boric Acid, Essential Oils, etc. An antiseptic preparation suitable for use as a *gargle* or mouth wash.—1 tablespoonful with an equal quantity of water (preferably warm).

As Nasal Douche.—Dilute four to eight times.

The commonest avenue of rheumatic infection is the tonsil and next to it the nose. Irrigation and thorough cleansing of the nose and pharynx with an antiseptic lotion is essential routine in anti-rheumatic treatment. The paper entitled 'The Avenues of Rheumatic Infection is the outcome of examination of 75 cases of Sydenham's chorea. Of these 88% showed nasal and pharyngeal inflammations.—W. P. S. Branson, B.M.J. ii./12,1432.

P1 **Formosyl Dental Dressing** in paste form is prepared containing 6% Cocaine.

Formosyl Pastils are useful to allay irritation and as antiseptic.

Liquor Formaldehydi Saponatus (*Off.*), contains 20% of Formaldehyde Solution (*Off.*).

✱**Bacterol.** (T. M. 369724, Class 3, and 346029 and 367083, Class 2.) A brown coloured antiseptic solution containing Formaldehyde, Iodine and Infusions of Eucalyptus and Alpine peppermint made by special process. "Medical," "Aeriform," "Veterinary" and "General" are made. It is claimed to be non-poisonous, non-caustic and non-staining. Its efficiency is not reduced by presence of Albumen or organic matter.

For instruments 2 to 3%. For wounds, sores and burns also for skin affections, *e.g.*, psoriasis, eczema, ringworm, *etc.*, 1 to 2 per 1000 warm solutions For obstetrical purposes warm injections of ½ to 1 per 1000. For urethra and bladder affections 1 per 1000 warm solution.

The aeriform variety is efficient for sterilising rooms. Anthrax spores *B. Coli*, Cholera vibrio and micrococcus pyogenes aureus on threads exposed in a room 10 by 12 by 9 ft. were killed after vaporising Bacterol for ½ hour and keeping the room closed for a further ½ hour.

Veterinary Bacterol is employed in 2 to 5 per 1000 warm solution. The **general** type is used diluted 2 to 5%.

Aniodol.—A solution of Formaldehyde in Glycerin, containing some Allyl Sulphocyanide. As a disinfectant for instruments, etc., 1 in 500 dilution. As antiseptic to wounds, 1 in 400. As a gargle, 1 in 2,000.

✱**Yadil** (T.M. 371511 Class 3, and 37152 Class 48).

Syn. **Tri-Methanal-Allyl Carbide.**

Dose.—Infants 10 to 20 drops, Children of 1 to 5 years 20 to 30 drops Adults 20 to 50 drops, in milk, tea or water thrice daily.

A water-white liquid having a slight allyl odour and a sweetish and pungent taste like Formalin. Sp. gr. 1·015. Neutral or very faintly acid.

Uses.—An antiseptic solution employed as a deodoriser and bactericide both internally and locally. For external use employ 1 in 300 as nasal spray, gargle or wash for offensive perspiration. Has been used for impetigo, acne, erysipelas, eczema and chilblains. For enemas and vaginal douches 1 in 150. For instruments 1 in 80.

Pasta Formalini, R.D.H. Thymol 1 drachm. Triturate thoroughly and add Paraform 3 grains, Glycerin 10 minims, Zinc Oxide 2 drachms. Mix.

✱**Paraform** (T.M. 216093) **Paraformic Aldehyde, Tri-oxy-methylene.** FR. CX. **Formaldehydum Polymerisatum, P. Belg.** $(H.COH)_3 = 90{\cdot}063$.

Manufacture.—On evaporating aqueous Formaldehyde solution Paraform (H.COH)*n* throws out which on drying changes to $(H.COH)_3$—Trioxymethylene (Schmidt). We have tried this and found the yield is practically theoretical.

PATENT. The C. & D. states this is probably the special form of polymerised formic aldehyde referred to in the " Eka-iodoform " patent (11228 of 1897) which is prepared by treating commercial Formalin solution with half its weight of concentrated sulphuric acid, at the same time cooling. The mixture is allowed to stand a few days and the precipitate washed and dried. This polymer behaves differently to the paraformaldehyde obtained by evaporating formic-aldehyde solution under the usual pressure or in a vacuum.

A polymer of formic aldehyde, in white friable amorphous masses, but slightly soluble in water, with an irritating vapour (Formaldehyde). Heated by an enclosed spirit lamp, it sublimes, combines with the products of combustion, is converted into formic aldehyde, and is a convenient means of applying the latter in vapour as an antiseptic and disinfectant. ***Room Disinfection:*** Sunlight, fresh air, soap and water and Formaldehyde are now relied on.—Tablets of Paraform 1 gramme, **Formalin-Disinfecting Tablets**, are prepared for use in a vaporiser,—1 to 20 tablets per 1,000 cubic feet, the latter number ensuring thorough disinfection. Walls and furniture should first be sprayed with water. They are also prepared of strength 0·1, 0·25 and 0·5 Gm. for disinfecting.

Fumigation with PARAFORM TABLETS is effectual, about 25 tablets being used to each 1,000 cubic feet, with an ordinary night light.

Employed against wrapped and unwrapped cultures of *B. Typhosus* in a brickwork chamber lined with white porcelain tiles small quantities of Paraform and Formaldehyde vapours were found to have the same destructive action, irrespective of association with aqueous vapour. It is not necessary to generate Formaldehyde vapour from Formalin Solution, as Paraform can be more conveniently used in practice. The use of 20 Gm. of Paraform or an equivalent of Formalin Solution, *i.e.*, 1¾ ounces of the 40% article killed the organisms by two hours exposure. Mixed vapours of Sulphur Dioxide and Formaldehyde may have advantages to destroy, in addition to bacteria, vermin such as moths, fleas and bugs. The efficacy of Sulphur Dioxide, particularly when in association with aqueous vapour, was also clearly re-established. —C. T. Kingzett, H. F. Bottomley and J. E. Brimley, M.P.C. ii./17,157.

Catheters may be maintained aseptic by wrapping in lint impregnated with 20% of paraform.

Paraform Collodion, 25% strength, applied three times a day to warts is efficacious.

Whooping-cough has been treated by inhalation of Formalin vapour—*i.e.*, from Paraform.

Insufflatio Paraformi. *Syn.* PARAFORM SNUFF.—Paraform 40, Ammonium Chloride 20, Lavender Oil 0·2, Menthol 0·5, Lycopodium to 100. This preparation should prove a useful nasal antiseptic. We found that Paraform as such, undiluted, can be tolerated by the nostrils without causing irritation or sneezing. If sneezing is undesirable the Ammonium Chloride must be omitted, also the Paraform may be reduced if preferred.

Mixtures of Paraform with Sodium, Barium or Strontium Peroxide, when brought into contact with water, yield formaldehyde vapour—subject of a patent.—P.J. i./07,472.

✻**Formitrol** (T.M. 306254) **Pastilles** are stated to contain about ⅙ grain 'Formaldehyde' and are used for disinfection.

✻**Formolyptol** (T. M. 258031), is stated to contain Formaldehyde (0·2%) Aceto-boro-glycerin (5%) with the active balsamic constituents of Pinus Pumilio, Eucalyptus, Storax, Myrrh and Benzoin, is a colorless, fragrant, non-toxic, non-acid, non-irritant solution for use as a spray, gargle, in tampons, mouth wash, wet dressing, irrigating fluid, douche, or internally.

Formaldehyde Tablets for **internal** administration contain Paraform ¼ grain, Milk Sugar 2 grains, Citric Acid, Peppermint and Sugar, *q.s.* to 10 grains. Useful antiseptic to the mouth.

Formamint Tablets are said to contain 0·01 Gm. 'Formaldehyde.'

The Trade Mark 264704 was the subject of an application for avoidance in 1914, but the application was refused. In 1916, however, it was ***removed from the register.***—C.D., ii./16,1070.

See however Nos. 301695, 325119 and 335409.

They weigh 1 Gm. each, and are said to contain 2% of the compound $C_{12}H_{22}O_{11}\ (CH_2O)_5 = 492·441$.—P.J. i./07,4; ii./07,838.

Manufactured under patent No. 2672, of 1906, by mixing 1 mol. of Milk Sugar (or 1 by weight) and at least 5 mols. of Formaldehyde in solution (say 1½ by weight of 40%) and heating in vacuum to 60–70° C. to density 32° Beaume. Evaporated to dryness, the solid substance is odourless, *soluble* in water, Alcohol and Acetone, and decomposes with certain substances.—P.J. ii./06,554. This patent became void in 4th year. The Lactose and Formaldehyde in Formamint are *not* chemically combined. Mixtures of different proportions can be made. German Patent annulled.—Prof. Thoms, P.J., i./15,41.

Value as a mouth disinfectant questioned.—Pres. 1910, p. 20.

✻**Aldemint** (T.M. 372093) **Throat Tablets** also contain Lactose and Formaldehyde.

Aldoform as also **Tholaform Tablets** liberate Formaldehyde. The latter contain Menthol and Paraform equal parts.

Increase the flow of saliva. For sore throats and mouth disinfection.

ALOE.

Aloe (*Off.*) is from *A. chinensis* (*Liliaceæ*), and *A. Perryi* and other species, known commercially as Curacao, Socotrine or Zanzibar Aloes. 'Aloe' Fr. Cx. and P. Jap, is from 'various species.'

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

For analytical data on Aloes see Vol. II.

The **Natal** or **Cape** varieties of Aloes are not official—they are of vitreous fracture, and characteristic odour, and mostly used for veterinary purposes. Have been found to contain as much as 6% Barbaloin. 'Aloe' P. Helv. is from *Aloe Ferox*, Miller. According to J. M. Wood, Cape Aloes is chiefly yielded by this plant.

Extractum Aloes (*Off.*).

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).

Barbados Aloes yield 60 to 70% of Extract, *c.f. Vol. II.*

Extractum Aloes Socotrinæ. B.P. 1885. Yield about 45%, *c.f. Vol. II. Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**).

Pilula Aloes et Ferri (*Off.*).

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Exsiccated Ferrous Sulphate 1, Aloes 2, Compound Cinnamon Powder 35, Glucose Syrup 3 or *q.s.*

Tablets are also prepared 4 grains each. An excellent remedy for habitual constipation.—W. W. W.

Pilula Triplex. *Dose.*—1 to 3 pills.

Aloes Extract 2 grains, Podophyllin ¼ grain, Mercurial Pill 1 grain. Cathartic with peculiar action on the liver.

Ⓟ**Pilula Aloes, Cascara et Hyoscyami.**

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Extract of Aloes, Extract of Cascara, Extract of Hyoscyamus, equal parts.

P1**Pilula Aloes, Nucis Vomicæ et Belladonnæ.**

Extract of Aloes 1, Extract of Nux Vomica ½, Extract of Belladonna ¼. In grains for one pill.

Tinctura Aloes (B.P. '98).

Dose.—1½ to 2 drachms (**6 to 8 Cc.**), or ½ to 1 drachm (**1·2 to 4 Cc.**) repeated. Extract of Barbados Aloes 1 in 40.

Pruritus vulvæ,—tampons saturated with Aloes Tincture give relief.—B.M.J.E. ii./08,23.

Glycerinum Aloes.

Evaporate Aloes Tincture 6 to 3, gradually adding Glycerin 30. Pigment for bed sores and anal fissures.

Dewees' Emmenagogue Mixture (H.).

Dose.—½ ounce thrice daily.

Tincture of Aloes 8, Tincture of Ferric Chloride 6, Tincture of Cantharides 2, Ammoniated Tincture of Guaiacum 3, Syrup to 90. Largely employed in the U.S. in functional and organic amenorrhœa.

Aperitive Elixir. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**)

Tincture of Aloes 2, Tincture of Myrrh 2, Tincture of Saffron 1.

Tinctura Aloes Composita, P. AUSTR.

Average dose.—1 to 2 drachms (**4 to 8 Cc.**).

Cape Aloes 15, Gentian Root 2½, Rhubarb 2½, Zedoary Root 2½, Saffron 2½, Alcohol (70%) 500.

For threadworms Aloes with carminative in the morning early. After evacuation an enema of 3 tablespoonfuls of salt—repeated during 10 days or so. Avoid salads and watercress.—B.M.J. i./07,540.

Pulvis Aloes cum Canella, P. DAN, 1836. *Hiera Picra.*

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Hepatic Aloes 16, White Canella Bark 3. Much used as a domestic emmenagogue.

Historical review of Hiera Picra.—B.M.J. ii./11,250,410.

For insect bites a saturated solution of Aloes in Tincture of Tolu—F. W. Cock, B.M.J. ii./18,256.

Aloin, $C_{16}H_{16}O_7, 3H_2O = 374{\cdot}256$. Tilden's formula for Barbaloin, was $C_{16}H_{18}O_7 = 322{\cdot}224$.

Official dose.—½ to 2 grains (**0·03 to 0·12 Gm.**). ¼ grain may be considered an aperient, and 1 grain a full purgative dose.—U.S. Dispensatory. The former is U.S. *Average dose.* In a pill with hard soap. Assuming Extract of Aloes to contain on an average 25% of Aloin, it follows that $\frac{1}{4}$ grain of the latter is equivalent in activity to 1 grain of Extract.

As *Hypodermic Purgative* has been tried,—$\frac{1}{2}$ grain in water 30 minims (sufficiently warm to dissolve), but not always satisfactory — B.M.J. i./12,168. Brickdale mentions 50 minims of a 10% solution. This appears to be a large dose.

A principle obtained officially from Barbados or Socotrine Aloes in odourless yellow crystals, having the characteristic taste of aloes; *soluble* in cold water, 1 in 140 (Barbaloin), in alcohol 90%, 1 in 20, almost insoluble in Ether. Aloes contains as much as 30% of Aloin. Aloin Chemistry.—Naylor, P.J. ii./06,73.

P1 **Pilula Aloin Composita.**—For constipation, Sir A. Clark recommended Aloin, extract of nux vomica, sulphate of iron, myrrh and soap, of each $\frac{1}{2}$ grain in a pill taken $\frac{1}{2}$ hour before last meal of the day. If fæces be hard and there be no special heart weakness add $\frac{1}{2}$ grain of ipecacuanha, and should griping be caused add also $\frac{1}{2}$ grain of extract of belladonna.

P1 **Tablets, Anti-Constipation.**—The above without Ipecacuanha.

P1 **Pilula Aloin, Strychninæ et Belladonnæ.**

Dose.—1 or 2. Aloin $\frac{1}{5}$, Strychnine $\frac{1}{60}$, Alcoholic Extract of Belladonna $\frac{1}{8}$, in each; in fractions of a grain, make one pill; of a gramme, fifteen pills.

P1 **Tablets of Aloin Compound** represent the latter with Ipecacuanha $\frac{1}{16}$ gr. **Tablets of Aloin** (Plain), $\frac{1}{10}$ and $\frac{1}{2}$ grain.

P1 **Pilulæ Laxativæ Compositæ, U.S. VIII.** 100 pills contain Aloin 1·3, Strychnine 0·05, Extract of Belladonna Leaves 0·8, Ipecacuanha 0·4, Glycyrrhiza 4·6 Gm., Syrup, *q.s.*

Suppositoria.—Fr. Cx. Aloes 0·5 Gm., Cacao Butter 2·5 Gm.

Ⓟ **Marienbad Tablets.** Published formula:—Aloes Extract 1·25, Rhubarb 1·25, Podophyllin 0·25, Cascara Extract 0·50, Belladonna Extract 0·12. Divided into 50 tablets, keratined and silvered.—Pres., Mar., 1907.

ALUMINIUM.

Al=27·1.

Alumen Purificatum (*Off.*) is Aluminium and Potassium Sulphate (Potash Alum) $Al_2(SO_4)_3\ K_2SO_4,\ 24H_2O=949{\cdot}024$, *or* the Ammonium Salt $Al_2(SO_4)_3(NH_4)_2SO_4,\ 24H_2O = 906{\cdot}848$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Soluble 1 in 10 of water.

Uses.—As an astringent for local application. Ulcers on the lips are cured by its use. As a mouth-wash its solution is possibly not desirable unless it be quickly removed by rinsing. Destruction of the teeth may occur.

Alumen Exsiccatum (*Off.*). *Syn.* Alum Ustum, Burnt Alum, is made by heating Potash Alum until it has lost 45 to 46% of its weight. It may also (U.S.) be made from Ammonium Alum.

Glycerinum Aluminis (*Off.*). 1 in 6, *v.* p. 428.

Ophthalmic Lamels contain $\frac{1}{250}$ grain of alum in each.

Points of Alum, also of **Copper Sulphate,** mounted in wooden cases, are prepared for ophthalmic and other uses.

Alumini Sulphas, *Syn.* ALUMINIUM TRISULPHATE. $Al_2(SO_4)_3 + 16H_2O = 630{\cdot}636$.

White crystalline powder or lumps made by dissolving freshly precipitated Aluminium Hydroxide in Sulphuric Acid. **Soluble** 1 in 1 of water nearly. Loses about 45·7% water of crystallisation on heating to 200° C.

Incompatible: alkalis and alkaline carbonates.

Liquor Aluminii Acetici, P.G.V., P. AUSTR. *Syn.* BUROW'S SOLUTION, **Solutum Aluminii Acetici,** P. BELG.

Dissolve Aluminium Sulphate 100 in Water 270 without heat. Filter and add Water to Sp. Gr. 1·152, and while constantly stirring pour in by degrees Precipitated Calcium Carbonate 46, mixed with Water 60, and finally Dilute Acetic Acid (30%) 120 in portions. Set aside in an open dish until gas evolution ceases, stirring frequently, then decant, press the sediment (without washing), filter the solution and dilute to Sp. Gr. 1·044 to 1·048. Contains 7·3 to 8·3% of Basic Aluminium Acetate $Al(C_2H_3O_2)_2OH = 162{\cdot}176$.

Diluted with twice as much water, thus making a 2½% solution, it has been used as an antiseptic lotion, and gauze impregnated with a 5% solution has been used as a dressing.

1 to 3 of orange flower water forms a pleasant mouth lotion.

C.L.T.E. has **Guttæ** of this liquor diluted 4 times—for use in acute otitis externa and media.

The P G. Liquor diluted 1 drachm to the ounce forms an approximate 1% solution. It is largely used on the Continent in clinics in place of the Boric Lotion used here. It is non-toxic, non-irritant and markedly astringent. For moist fomentations and as the medicament for a bath in which to place hand or foot for continuous irrigation. In dermatitis whatever be its cause, in suppurating open wounds and in cutaneous erysipelas there is nothing to equal fomentation with it. An objection is, however, that after three weeks' continuous irrigation tissues become very hard. Twenty-four hours immersion in warm normal saline (one drachm to the pint) largely removes the indurated state.—H. F. Waterhouse—B.M.J. ii./10,62.

It may however be followed by serious destructive effects. As its antiseptic power is slight, Boric Acid Lotion is better, being harmless.—L. ii./12,772: P.J. ii./12,712.

Wet dressings of Glycerinated Alcohol could successfully replace the solution of Aluminium Acetate. The preparation recommended is a mixture of equal parts of Alcohol 96% and Glycerin.—Pr. March, 1913,639.

Aluminii Acetas. $Al_2(OH)_2(C_2H_3O_2)_4$ (?) = 324·352.

White powder slightly *soluble* in water.

Is used as a desiccant and deodorant in powder or with glycerin.

Note.—**Neutral Aluminium Acetate.** $Al_2(CH_3COO)_6 = 408{\cdot}404$ is only known in Solution. If such a Solution be evaporated below 38° C. the basic salt of formula probably $Al_2(OH)_2(CH_3COO)_4$ soluble in water is obtainable as in the Liquor above. If on the other hand the Solution be boiled the basic salt, probably of formula $Al_2(OH)_4(CH_3COO)_2$ is thrown out, *i.e.*, it is insoluble in water.

For ophthalmia neonatorum 10% Ointment has been used applied between the lids every hour in place of Silver Nitrate drops.

Œdematous swelling, antiphlogistic treatment with cooling applications, boric acid and acetate of aluminium.—B.M.J.E. i./10,36.

Aluminii Aceto-Tartras, PH. NED.—*Syn.* ALSOL.

Made by dissolving Aluminium Hydroxide freshly precipitated in Acetic and Tartaric Acids. We use 312, 360 and 450 parts respectively

In shining masses, ***Soluble*** in water. An astringent and antiseptic employed in 1 or 2% solution as mouth wash and gargle. Also for wound treatment the same strength.

Solubility.—We find that a solution as strong as 50% in water can be made. Powder finely, and allow to macerate a few hours with shaking, The salt is more rapidly soluble in Ammonium Chloride and in Ammonium Acetate Solutions.

Liquor Aluminii - Aceto - Tartratis, *Syn.* **Aluminium Aceto-Tartaricum Solutum, P. Helv.**

Dissolve Aluminium Sulphate 30 in warm water 100, cool and add Acetic Acid (30%) 36, then, with stirring, Calcium Carbonate 13 in water 35, allow to stand 24 hours with occasional shaking, filter off the solution and add to every 100 of filtrate Tartaric Acid 3½.

Specific Gravity 1·055 to 1·059. Contains about 10% Aluminium Aceto-Tartrate. According to P. Helv. this is to be supplied when Liquor Aluminii Acetatis is ordered. This formula contains Aluminium Sulphate and an excess of Acid.

Stomatitis treated by frequent rinsing of the mouth with this Solution and Salol as paste to the parts.—L. i./09,396

Liquor Aluminii Formatis.—We find this may be prepared by precipitating the Hydroxide from 630 of Aluminium Sulphate crystals, and dissolving in 1152 of 25% Formic Acid. Thus made it contains the equivalent approximately of ⅛ of its weight Aluminium Formate taken as Al_2 $(H.COO)_6$ Other formulæ have been given for Aluminium Formate. Employed like the foregoing as a gargle diluted 1 to 3% with water, useful.

Aluminii Chloridum, $Al_2Cl_6.12H_2O=483·152$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**).

A white, amorphous deliquescent powder. Of distinct service in locomotor ataxy; relieves the lightning pains. May be combined with other drugs.—L. ii./99,1826; B.M.J. i./05,5.

Liquor Aluminii Chloridi. Dissolve Aluminium Chloride $(+12H_2O)$ 20, in water to produce 34 by volume=42·5% by weight.

Pilula Aluminii Chloridi.—*Martindale.*—2 grains in each.

Dose.—1 to 2 thrice daily. These are convenient for treatment, being portable.

Aluminii Chloras, $Al(ClO_3)_3=277·48$.

Deliquescent crystals containing either 6 or 9 H_2O.

A 25% solution may be prescribed. This further diluted 1 to 25 forms a 1% mouth wash or spray in throat affections, and as a prophylactic against infection.

A 20% solution of the Chlorate in Water or Glycerin has been used on tampons for leucorrhœa or cervical catarrh.

Alumini Hydroxidum, U.S.

Prepared by pouring hot potash alum solution into a hot solution of Sodium Carbonate.

***Alumnole** (T.M. 215948) is aluminium naphthol-sulphonate.

Manufacture by interaction between Barium Betanaphthol Sulphonate and Aluminium Sulphate Solutions. The Barium compound is made by warming Betanaphthol 10 in Sulphuric Acid 8 on a water bath until a sample dissolves clear in water, then diluting and saturating with Barium Carbonate, filtering and evaporating to dryness (Patent 10,668 expired 1902).

Lotion, gargle and ointment ¼ to 2% in pharyngitis, rhinitis, ozœna, and gonorrhœa

Soldering Aluminium.—A large number of solders and appropriate fluxes are given C.D. ii./07,631, to which reference should be made by those seeking information.

Thermit is a mixture of powered Aluminium and magnetic Iron Oxide used in welding Iron and Steel and in repairing broken steel castings.—P.J. i./15,784.

Duralumin.— An alloy of Aluminium slightly heavier than the pure element.—Its strength is about the same as mild steel. Practically non-corrodible. Recommended for surgical appliances, splints, etc.—B.M.J. i./12,236.

Aluminium Vessels.—Experiments with Aluminium laboratory and kitchen utensils. These stood tests well—no suspicion of conveying poisonous metals. Aluminium is not appreciably acted on in cooking. It is, of course, a good conductor of heat Aluminium vessels when not in use should be kept perfectly dry. Water, for example, should not be left in soldiers' water bottles. It is stated that the Aluminium used contains only 2% of impurities —L. i./13,54.

Pulvis pro Pedibus, P. Helv.

Potash Alum 15, Talc 85, in fine powder. For tender feet. Another useful form of **Foot Powder** is : Talc 2, Boric Acid 2, Orris 1, Zinc Oleate Powder 1.

Kaolin (*Off.*) **Bolus Alba, P.G.V., P. Jap.**

Native white aluminium silicate, $H_2Al_2Si_2O_8+H_2O=258{\cdot}832$ purified by elutriation from sandy matter; it is a smooth white powder. A useful absorbent powder for irritation of the skin. It is unacted upon by most chemicals, hence used for making pills of Silver Nitrate, Gold Chloride, and Potassium Permanganate (*see* Unguentum Kaolini). It is useful for sprinkling on to the filter paper in clarifying liquids. It should leave not less than 85% non-volatile residue on ignition nor contain marked impurity of iron.

Vaginal insufflation of the powder with subsequent douching to check discharge has been tried. The dry method is claimed to have a prophylactic value—by absorbing irritant discharge the production of fresh erosion is prevented, and those existing have an opportunity of healing

For its absorbent and emollient property it has been given internally in 1 to 2 Gm. doses in water in bacterial infections.

Operative Skin Preparation and Treatment.

All clean wounds heal better if kept dry. Moisture undoubtedly favours or provokes inflammation,—water is, of course, a *sine qua non* for the life of vital organisms. The day of moist dressings is over. It is best to clean the skin with Ether Soap, then go over with Turpentine, then with Biniodide in Spirit, finally cover with Sterile Kaolin and bandage with a dry sterile compress, but no protective Oil Silk, Gutta Percha Tissue, etc., to keep moisture in.—L. i./13, 1052.

Cimolite is a special preparation, agreeably perfumed.

***Emol Keleet** (T.M. 178456 and 350176) and * **Dimatos** (T.M. 198508) are similar. **Fuller's Earth** (China Clay) contains traces of Iron and Magnesia.

Terra Alba in commerce is variously Kaolin. Gypsum, Burnt Alum or Magnesia, in preference the first.—W. H. M.

Westcott has drawn attention to the frequent deaths of infants by tetanus when Fullers Earth has been applied to sores on navel and nates—there may be serious risk of infection of more than one kind from the use of this unsterilised earth. Warning should be given to the poor not to use this. Boric Acid with Zinc Oxide and Starch is safe in use.—B.M.J. i./08,892.

Unguentum Kaolini.

Soft Paraffin 1, Hard Paraffin 1 ; melt, add Kaolin 1, and stir till cold. Spread on rag to apply on abraded skin, it allays irritation. Also as pill excipient, *v. ante.*

Asbestos in intimate contact, *e.g.*, with Solutions, has an action on various substances. Diastase, *e.g.*, is removed from liquids containing this ferment in 24 hours,—the Asbestos itself becoming active. Starch Paste (0·5% in water) in presence of Asbestos, after 3 months, shows no trace of Starch in Solution,—it is converted into Sugar. The Asbestos also gives no Starch reaction. It reduces the radio-activity of radio-active waters and of Thorium Nitrate Solution. Gelatin loses its power of setting again. It also removes Alkaloids, Proteins and Hormones (*e.g.*, Adrenalin) from Solutions. —B.M.J. ii./13,1362,1376.

Extraction of Morphine and other alkaloids by means of an insoluble Silicate of Metal of the Aluminium group, *e.g.*, Fullers Earth. Subject of patent.—P.J. i./14,32.

Talc. A native foliaceous magnesium silicate ; that from the Tyrol—Venetian Talc—is soft and unctuous.

Talcum Purificatum, U.S., is the above purified (by hydrochloric acid).

French Chalk is a harder silicate of magnesium.

Kieselguhr, a diatomaceous or infusorial earth, known as white peat, burnt produces a light absorbent powder. It is used in making tooth pastes. **Ceyssatite** is a calcined siliceous earth from Ceyssa (Auvergne). —F.N., 1908.

Portland Cement is prepared by incinerating a mixture of Limestone and Clay. Consists mainly of Calcium and Aluminium Silicates. Possesses the property of solidifying to a stone on moistening with water—presumably owing to formation of Hydrous Calcium—Aluminium Silicates and Calcium Aluminates. A large proportion of the lime is, however, present in the cement when "set" as Calcium Hydroxide. Might be used for its scouring effect on wounds.—L. ii./17,368.

AMMONIUM.

$NH_4=18·042$.

Ammonii Bromidum (*Off.*). $NH_4Br.=97·962$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

Small colourless crystals ***Soluble*** in water 2 in 3, less in alcohol (1 in 15). ***Incompatible*** with mineral acids and silver nitrate.

Limit of Lead content as impurity—10 parts per million.

Flavoring.—Glyl Vanillæ, Glyl Rosæ (excellent) ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Possesses similar sedative properties to those of the other bromides, and is thought to cause less depression.

In sea sickness Ammonium Bromide, beginning a day or so before the voyage, in doses of 20 grains in Chloroform Water with 15 grains of Sodium Bicarbonate thrice a day found useful.—Yeo.

In tinnitus a course of ammonium bromide with Syrup of Glycerophosphates does well in some cases. The Bromide at bedtime.—Sir James Barr, B.M.J. ii./09,1131.

Tablets, 5 grains (**0·3 Gm.**) and 10 grains (**0·6 Gm.**).

Dose.—1 to 6 or more.

Effervescent Ammonium Bromide.

Dose.—1 drachm. Contains 5 grains.

Linctus Ammonii Bromidi. *Syn.* **Elixir Ammonii Bromidi.**

Dose.—1 to 2 drachms (4 to 8 Cc.). Contains 10%.

A palatable method of administering for throat affections.

Mistura Ammonii Bromidi, Phenazoni et Caffeinæ.

Dose.—One ounce (30 Cc.).

Ammonium Bromide 10 grains, Phenazone 10 grains, Caffeine Citrate 5 grains. Chloroform Water to 1 ounce.

Ordinary headache is rapidly relieved by this repeated in two hours if necessary.—A. P. Luff, B.M.J. i./14,635.

Pastilli Ammonii Bromidi. 1 grain in each with Glyco-gelatin basis. For whooping-cough and throat affections.

Trochisci Ammonii Bromidi with Gum basis, containing 1 grain each, are very useful in asthma and for tickling cough.

Ammonii Carbonas. (*Off.*).

$NH_4HCO_3 : NH_4NH_2.CO_2 = 157·128$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White masses with ammoniacal odour and alkaline taste, consisting of **Ammonium Bicarbonate** and Carbamate. A stimulant, carminative and expectorant.

Soluble 1 in 4 water, 1 in 5 glycerin.

Incompatible with acids, iron salts and salts of alkaline earths. For equivalents to acids *v.* Neutralisation Table.

Method of direct titration.—P.J. ii./05,864.

In broncho-pneumonia ½ to 1 grain doses useful, combined with a little potassium iodide or ammonium chloride, tincture of nux vomica and syrup of tolu.—M.P.C. Jan. 16, '08,601. Even grain doses for infants of six months.—Cautley.

In bronchitis 30 grain doses were advised by the late Sir L. Brunton as emetic. Has advantage of being a stimulant:—

" In smaller doses it stimulates the secretion of gastric juice, may be used in atonic dyspepsia, flatulence, etc., as a substitute for alcohol. From its power of stimulating the respiratory centre, it is employed as a stimulating *expectorant* in chronic bronchitis, in the broncho-pneumonia of children, and in asthma depending on cardiac disease."

Ammonii Chloridum. (*Off.*). $NH_4Cl = 54·502$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White crystals soluble 1 in 3 of water.

Liquid extract of liquorice disguises its nauseous taste.

Incompatible with carbonates of alkalis and alkaline earths.

Flavoring.—Glyl Rosæ, Glyl Coriandri, Syl Lavandulæ, Syl Aurantii Amari; Extractum Glycyrrhizæ, Syrupus Tolutanus.

For use as an anti-alcohol remedy, *see* Alcohol.

Lotio Evaporans *Syn.* **Lotio Ammonii Chloridi,** Gt. Orm. H.

Ammonium Chloride 15 grains, Alcohol 90% 1 drachm, Water to 1 ounce.

Tablets, 3 and 5 grains: also 3 grains with Borax 2 grains.

Trochisci Ammonii Chloridi, T.H. 'F.' 2 grains, marked 'M.A.' One every 3 hours useful in congestion of the pharynx and larynx, loss of voice arising from cold and bronchial cough.

Trochisci Ammonii Chloridi cum Glycyrrhiza.

Contain 3 grains of each. **Tablets** are also made same strength.

Trochisci Ammonii Chloridi Compositi, T.H. Contain Ammonium Chloride 1 grain, Potassium Chlorate 2 grains, and ½ grain approximately of Cubebs. Marked 'C.M.A.'

Vapor Ammonii Chloridi is used in affections of the throat and Eustachian tube.

Inhalers, Ammonium Chloride.—Godfrey's, Basdon's, and Maw's are varieties on the market. They are all the same in principle, which consists in combining the vapour of ammonia and hydrochloric acid.

Ammonii Iodidum, U.S. $NH_4I = 144{\cdot}962$.

Average dose.—5 grains (0·3 **Gm.**).

A white granular salt containing not less than 99% pure ammonium iodide in minute crystalline cubes, very deliquescent and soon becoming yellow or yellowish brown on exposure to air; odourless when white, with a sharp saline taste and a neutral reaction. ***Soluble*** 1 in less than 1 of Water, 1 in 3 of 90% Alcohol (by experiment). Should be kept from light and air, or free iodine is quickly liberated. It causes less depression than potassium iodide, and is preferred for syphilis and rheumatism.

Ammonii Nitras. $NH_4NO_3 = 80{\cdot}052$ B.P. 1885.

The fused salt is used for making **Nitrous Oxide** $N_2O = 44{\cdot}05$; on heating to 350° F. it splits up into this gas and water vapour.

The gas is passed through a strong solution of ferrous sulphate to remove nitric oxide—the traces of acid being removed by passing through alkali. The gas is considered one of the safest anæsthetics. The heart is not directly affected by its action.

There is no anæsthetic, if carefully given, comparable to nitrous oxide for quietly and pleasantly inducing anæsthesia.—L. i./10,625.

A Nasal Inhaler for continuous administration.—L. ii./10,1840.

Instructions for treatment if dangerous symptoms arise during administration of nitrous oxide.

Dangers arising under gas are almost invariably due to failure of the respiration caused either by obstruction or over dose. Obstruction may result from "falling back of the tongue," from pressure due to engorgement of the thyroid or thymus, or other glands in the neck, or from foreign bodies entering the respiratory passages—teeth, bloodclot, vomit, &c. Over-dose is more likely to occur if the patient's clothing be not loose.

If the breathing stop, give no more anæsthetic, clear the mouth and pharynx with a swab or towel round the finger, pull forward the tongue and compress the lower ribs; if no air enter or leave the chest, place the patient upon his side upon the floor, with a pillow or something equivalent under his shoulders. Loosen his clothing, pull the tongue forward and give the tongue forceps to an assistant to keep up the traction. Try to expel any possible obstruction by compressing the lower ribs and abdomen, and then turn the patient upon his back and begin artificial respiration, giving oxygen gas and applying nitrite of amyl or weak ammonia vapour to the nostrils meanwhile. If there be another assistant tell him to give an injection of strychnine ($\frac{1}{30}$ grain) or 1 drachm of ether or both, but do not stop the artificial respiration or waste time over the injection yourself. If no air enter or leave the chest during the artificial respiration, do tracheotomy forthwith, and immediately the trachea is entered resume the artificial respiration and continue it for at least an hour, keeping the patient warm during this time. R. D. H. has revised these instructions in some particulars.

Nitrous Oxide and Oxygen for major surgery extensively used in the U.S. Discussion on value. Danger of asphyxiation, and dangerous shock may come on immediately after withdrawing the anæsthetic. For major operations this method is not favoured in this country (Sir F. Hewitt) —L. i./13, 333. The method is described by H. P. Fairlie and recommended for major operations. Results. Anæsthesia varying from 11 to 75 minutes.—Pr. Aug. '13,267.

H. M. Page said the special indications for the method are: (1) desperate cases from toxæmia, traumatism or hæmorrhage, if spinal anæsthesia were not used; (2) operations on diabetics; (3) in certain genito-urinary operations. A previous injection of a narcotic with atropine is advised, and failing this atropine alone. Induction recommended to be always done with addition of Ether. H. Bellamy Gardner agreed as to use in diabetics, but not in favour of for abdominal sections.—L. i./13,459

In major operations Teter gives as an average 100 gallons Nitrous Oxide and 20 gallons of Oxygen for one hour's anæsthesia. The temperature of the gases should be 85 to 90° F. His apparatus consists of a stand carrying two cylinders each of Nitrous Oxide and Oxygen and an Ether attachment. The cylinders are in pairs, so that an empty one can be replaced without interfering with the administration.

For operations on regions other than the mouth or nose, injections of Atropine 1/150 to 1/100 grain, Morphine 1/8 to 1/6 grain are given hypodermically 1½ or even 2 hours before the inhalation. Crile and others add Scopolamine 1/200 to 1/100 grain. At first Nitrous Oxide with 2% Oxygen is given with a pressure of 4 to 40 m.m. of Mercury. More or less Oxygen is given according to circumstances—more if patient is cyanosed, less if he struggles. Unconquerable rigidity is controlled by giving Ether—this may occur in about 10% of cases.—D. W. Buxton's "Anæsthetics," 5th Edition.

As anæsthetic in dental work, the average quantity of gas used is 2 to 3 gallons and Oxygen 6—12 ounces. Portable apparatus for the gases.

Results in dentistry better than gas alone.—L. ii./12,1372, 1464.

In military surgery Nitrous Oxide and oxygen with rebreathing—stated to be infinitely better than Ether or Chloroform.—H. E. G. Boyle, L. ii./17,667

Ammonii Sulphas $(NH_4)_2SO_4 = 132{\cdot}144$.

Colourless crystals soluble 1 in less than 1 of water. Its chief use is as fertiliser and for fire proofing. It is made by distilling gas liquor with lime, into Sulphuric Acid and is a source of Ammonia for refrigeration and similar purposes.

Ammonii Valerianas. **Ammonii Valeras,** U.S. $NH_4.C_5H_9O_2 = 119{\cdot}139$. Fr. Cx. Another formula, — $NH_4.C_5H_9O_2 + 2C_5H_{10}O_2 = 323{\cdot}349$.

Dose.—1 to 8 grains (**0·06 to 0·5 Gm.**). In masses of flat colourless deliquescent crystals, with a strong valerian odour, very soluble in water and alcohol. A 25% aqueous solution is prepared for dispensing. *Solute de Valerianate d'Ammoniaque Composé,* a French

'Nerve Tonic' (Fr. Cx. and P. Helv.), is Valerianic Acid 3, Ammonium Carbonate *q.s.* (about 4) to neutralise, Extract of Valerian 2, Water to 100 all by weight. *Dose.*—2 to 4 drachms (**7 to 15 Cc.**).

Linimentum Ammoniæ (*Off.*).

Solution of Ammonia 1, Almond Oil 1, Olive Oil 2. Shake together. Arachis or Sesame Oil may be used in parts of the Empire.

To make more fluid, mix the Almond Oil and the Ammonia Solution and the Olive Oil afterwards.—P.J. ii./07,287.

'Hartshorn and Oil' is usually Solution of Ammonia 1 and Almond Oil 3, shaken together.

Liquor Ammoniæ. *In Great Britain and Ireland to be labelled "Poisonous—Not to be taken," to be supplied in bottle distinguishable by touch.* For further conditions of Sale *v.* p. 47. (*Off.*).—Sp. Gr. 0·959, **'Ammonia.'** This and **Aqua Ammoniæ,** U.S., contains 10% by weight of NH_3. Fr. Cx.—**Ammoniaque Diluée** about the same.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**).—(Not official.) *Average dose.*—15 minims (U.S.).

Hypodermic injections of 2 to 6 minims for collapse; or up to 36 minims for snake poisoning; internally is stimulant, diuretic and diaphoretic.

In embolism large doses of ammonia well diluted tend to reduce the coagulability of the blood.—Whitla, Pract. Med. p. 361.

In a case of lateral sinus thrombosis the wound, an extensive one—after operating and lavage, dressed daily with Cyanide Gauze soaked in a Soap Emulsion (Potash Soap 1 drachm, Soda Soap 1 drachm, Olive Oil 1 drachm, Distilled Water to 1 pint). An Ammonia mixture (5 minim dose) was given every 4 hours. In addition to its stimulating effects, Ammonia reduces liability to thrombosis by its action on the blood.—P.R.S.M. Otol. Sect. Dec. '10.

Liquor Ammoniæ Fortis. "*Poisonous—Not to be taken,*" *C.f.* Liquor Ammoniæ (*Off.*)—Sp. Gr. 0·888.

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**).

Contains 32·5% by weight NH_3. (Aqua Ammoniæ Fortior, U.S. IX. contains 27 to 29%. **Ammoniaque officinale.** Fr. Cx. 20·18%.)

Germicidal action, see *Vol. II.*

Haber, of Karlsruhe, succeeded in combining atmospheric Nitrogen with Hydrogen producing Synthetic Ammonia.—Na. Feb., 1911,560.

Capsules of Strong Ammonia, 3 minims in each.

Encased in cotton wool and silk. Are intended as a restorative—to be crushed and contents inhaled—a portable form of smelling bottle.

Enema Ammoniæ.—Strong Ammonia Solution 1, Water 160 (1 drachm to the pint).

In the treatment of post operative ileus and intestinal paresis—a sequel of abdominal operations most distressing to the patient. Its effect is enhanced by a dose of Pituitary Extract hypodermically given ½ hour previously. Effects a good motion and discharge of excessive flatus. Not to be used too frequently or in excess of above strength.—T. A. Black, L. ii./16,374.

Liquor Ammoniæ Domesticus (*vel* **Detergens**), **Household Ammonia.** *Signa*—"*Poisonous—Not to be taken.*"

Oleic Acid 1, Alcohol 1, mix and add strong Solution of Ammonia 7, Distilled Water 7; shake well. For use diluted as a detergent of the skin. In the bath 1 in 1,000 to 2,000 softens the water; also for general domestic purposes.

Cloudy Ammonia is made with tap water—for this the gravity of the preparation must not be too light, otherwise the lime salts constituting the 'Cloud' will settle down. We can recommend the following:—Dissolve Castile Soap 1·3, in Water 60, and add Strong Solution of Ammonia 27, Lime Water 0·6, and Water to 100.

Hair Lotion, Erasmus Wilson's.

Strong Solution of Ammonia 1, Almond Oil 1, Spirit of Rosemary (B.P. 1885) 4, Honey Water 2.

For alopecia areata Strong Ammonia Solution 1, Chloroform 1, Olive Oil 1, Spirit of Rosemary to 8 is useful.

Liquor Ammonii Acetatis (*Off.*).

Dose.—2 to 6 drachms (**8 to 24 Cc.**).

Keep in green glass stoppered bottles.

The neutral point may be found by trying effect on a little ammonium carbonate on a watch glass.

U.S. is similar and contains not less than 7% Ammonium Acetate.

Mistura Anti-Catarrhalis. BURNEY YEO.

Solution of Ammonium Acetate 3 drachms, Spirit of Nitrous Ether 1 drachm, Opium Tincture 10 minims, Ipecacuanha Wine 5 minims, Camphor Water to 1½ ounces. To be taken at night. Assists action of skin and kidneys.

Liquor Ammonii Acetatis Fortior. B.P. 1885.

Dose.—25 to 75 minims (**1.5 to 5 Cc.**). Ammonium Carbonate 1, Acetic Acid *q.s.*, Water to 4, *i.e.*, approx. 5 times as strong as the *Off.* Liquor.

Acetate d'Ammonium Dissous (Solution Officinale). FR. CX.

Contains 18·5% by weight of Ammonium Acetate.

Ammonii Acetas.—$CH_3.COONH_4 = 77·076$

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

This salt is obtainable in white crystals, very soluble in water

Incompatible with mineral acids, alkaline carbonates, potassium chlorate and dichromate, mercurous nitrate.

Serviceable in all fevers and in delirium tremens, one drachm every hour at first, reduced gradually.

Choice of a diuretic—Ammonium Sodium and Potassium Acetates, Citrates and Tartrates, increase osmosis and are diuretics by stimulating the convoluted tubes of the kidney. They draw water from the tissues into the blood stream; they do not irritate the kidneys and may be used even when the organs are acutely inflamed,—they should be well diluted. Useful to combine Spirit of Nitrous Ether with them, which, owing to the Ethyl Nitrite contained in it, is a useful agent in causing dilatation of the different vessels of the kidney. The action of these drugs, *e.g.*, in renal dropsy should be encouraged by sufficient doses of a watery aperient every day or other day, *e.g.*, Compound Jalap Powder.—B.M.J. i./11,289.

Mistura Febrifuga, N. H. W. Solution of Ammonium Acetate 2 drachms, Spirit of Nitre 20 minims, Sodium Bicarbonate 5 grains, Chloroform Water to ½ ounce.

Liquor Ammonii Citratis (*Off.*).

Dose.—2 to 6 drachms (**8 to 24 Cc.**).

Prepared by neutralising Citric Acid 10, with Ammonium Carbonate 7 or *q.s.* in Distilled Water *q.s.* to 80. Keep in green bottles.

Liquor Ammonii Citratis Fortior. B.P. 1885.

Dose.—30 to 90 minims (**2 to 6 Cc.**).

Was four times as strong as the present liquor (above).

Ammonii Citras.—$C_3H_4.OH(COONH_4)_3=243{\cdot}196$.

This salt is a deliquescent white powder, diuretic, and acts similarly to the acetate. *Dose.*—30 to 60 grains (**2 to 4 Gm.**).

In pneumonia a mixture of the following : Solution of Ammonium Citrate 30 minims with Potassium Iodide 4 grains and Potassium Citrate 10 grains, in a tablespoonful of water every four hours,—an 8 ounce bottle made up as above proved an efficient treatment for the seventh time in a bad case.—L. i./09,160.

Ammonii Tartras $(CHOH)_2(COO)_2(NH_4)_2=184{\cdot}136$.

White crystals soluble in water.

Irrigation (under Cocaine initially) with 5 to 10, and ultimately 20% solution, in a case of erosion of the cornea,—complete clarification.—M. /08,128.

Spiritus Ammoniæ Fetidus (*Off.*).

Asafœtida 75, Strong Solution of Ammonia 100, Alcohol 90% to 1,000 Distil.

Spiritus Ammoniæ, U.S. VIII. *Syn.* **Alcohol Ammoniatum.** *Average dose.*—15 minims. A solution containing not less than 10% ammonia by weight in alcohol 90%. Sp. Gr. 0·808 at 25° C.

Uses.—Similar to Sal Volatile as stimulant, but not so palatable.

Flavoring.—Syl Menthæ Piperitæ, Syl Limonis, Syl Coriandri (all double dose) ; Syrupus Zingiberis (not so good).

Spiritus Dzondii, Ph. Bor. is a similar preparation.

Spiritus Ammoniæ Aromaticus (*Off.*).

Dose.—20 to 40 minims, for repeated administration ; single, 60 to 90 minims.

Contains approximately 2·4% by weight of NH_3. That of U.S. contains Ammonium Carbonate 3·4, Ammonia Water 9, Lemon Oil 1, Lavender Oil 0·1, Nutmeg Oil 0·1, Alcohol 70, Water to 100 and is not distilled.

Liquor Ammoniæ Aromaticus (Simplex).

Ammonium Carbonate 4 ounces, Strong Solution of Ammonia 8 ounces, Terpeneless Oil of Lemon 13 minims, Terpeneless Oil of Nutmeg 54 minims, Alcohol (90%) 6 ounces, Distilled Water 149 ounces. The Oils to be dissolved in the Spirit before adding to the rest of the mixture. Suggested as being useful in ‘Stock Mixtures’—*i.e.*, for Hospital work, etc., where the saving of Spirit is generally a consideration.—P.J. i./11,56.

This preparation mixes perfectly clear with water as distinct from the official Spirit. It is not so pungent to the taste as Sal Volatile.

A Liquor Ammoniæ Aromaticus may also be prepared *Concentrated.* —P.J. i./11,124.

Liquor pro Spiritu Ammoniæ Aromatico.

For dilution 1 with 3 of a mixture of Alcohol (90%) 12 and Water 1.

Dissolve Ammonium Carbonate 4 ounces in Water 20 ounces. Add Strong Solution of Ammonia 8 ounces then Terpeneless Nutmeg Oil 54 minims and Terpeneless Lemon Oil 13 minims in Alcohol (90%) 10 ounces.

May also be prepared for dilution 1 *with* 2 with the same Alcohol mixture as for the '1 with 3' preparation above. In this case proceed as for the latter, but dissolve the Ammonium Carbonate in Water 21½ ounces and the Oils in Alcohol 90% 21½ ounces. This is clearer than the above.

Note.—It is not practicable to make a Concentrated Liquor for dilution with *Water only.* Our experiments show it is not possible to make the Concentrated Liquor much stronger in Alcohol than is contained in the above, as the Ammonium Salts are thrown out.

AMYGDALA AMARA. (*Rosaceæ.*)

Bitter Almond. (*Off.*).

Oleum Amygdalæ (*Off.*) is expressed from the seeds (Peach or Apricot kernel Oils, or mixtures are sold commercially as Oleum Amygdalæ Persicæ*), which yield about 40%, and the residue is utilised for the production of Essential Oil of Bitter Almonds (**Benzaldehyde,** C_6H_5COH = 106·083, or Oleum Amygdalæ Essentiale *sine* Acido Hydrocyanico). **Benzaldehyde** is official in P.G.V. and U.S. *Dose.*—½ minim (**0·03 Cc.**). In latter case produced artificially or as above, containing not less than 85%. Sp. Gr. 1·045 at 25° C. B. pt., 179° to 180° C. Tests for hydrocyanic acid and chlorinated products and assay process are given in U.S. Is a flavouring agent—non-poisonous. The Essential Oil containing the Hydrocyanic Acid to the extent of about 5% is also prepared and must be carefully distinguished from this. (That ordered by U.S. contains not less than 2 or more than 4%.) The glucoside **Amygdalin** $C_{20}H_{27}NO_{11},3H_2O$ = 511·374 (P. Svec.)—crystals soluble in 12 parts of water with slightly bitter taste and neutral action—under the influence of **Emulsin**†, a constituent in the seeds, of the nature of a ferment, hydrolyses (takes up water) on coming in contact with it, forming grape sugar and Benzaldehyde-hydrocyanic Acid, $C_6H_5COH+HCN$ = 133·106. This latter compound is decomposed and the Hydrocyanic Acid is removed so as to produce the above

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*[P1] *Almonds, Essential Oil of (unless deprived of Prussic Acid), also preparations or admixtures containing,* is now obtained from apricot (*Prunus Armeniaca*) kernels. Suggested to alter name to one derived from that of the apricot.—C.D., Feb. ii./05.

Bieber's modified Nitric Acid Test indicates presence of small quantities of Peach Oil in Almond Oil.—P.J. ii./09,760. C.D. ii./09,929. *c.f.* B.P. 1914.

No pharmacological difference between this oil and the expressed oil of almonds, but therapeutically distinction essential.—P.J i./05,81. Kernel oil has the higher Iodine No., *vide Vol. II*

† See also Enzyme Table, Vol. II.

Essential Oil suitable for flavouring purposes. A similar body to Amygdalin, or one identical with it, is contained in *Prunus Laurocerasus.*[*] (Cherry Laurel Leaves).

[P1] **Aqua Laurocerasi** is standardised (*Off.*, Fr. Cx., P.G.V. and F.I.) to 0·1% Hydrocyanic Acid. It also contains some Benzaldehyde.

For analytical data, vide Vol. II.

[P1] **Aqua Amygdalæ Amaræ** should contain the same amount of Hydrocyanic Acid.—F.I., P.G.V., and P. Jap. (U.S. is 1 of oil of bitter almonds shaken in 1,000 of water and filtered.) *Average dose,* 1 drachm.

F. Norsk gives a "synthetic" Bitter Almond Water, viz.:—
Oil of Bitter Almond 4, Hydrocyanic Acid (2%) 50, Alcohol (90%) 146, Distilled Water 800. Contains 0·1% HCN.

Amygdalin is also contained in the bark of *Prunus serotina* (Virginian Prune or Wild Cherry bark), and the same action occurs when this drug is bruised with water.

Solubility.—Almond oil dissolves in all proportions in chloroform, about 1 in $2\frac{1}{2}$ of ether and slightly in alcohol 90%.

Spiritus Amygdalæ Amaræ, U.S. *Average dose.*—8 minims. Oil of Bitter Almond 1, Alcohol 80, Distilled Water to 100.

Amygdala Dulcis also yields about the same amount of Oleum Amygdalæ (*Off.*) and contains Emulsin, but is free from Amygdalin.

Pulvis Amygdalæ Compositus (*Off.*).—Sweet Almonds powdered (*s.a.*) 6, Refined Sugar 3, Powdered Gum Acacia 1.

Mistura Amygdalæ (*Off.*) contains of this Powder 1, Water to 8, rubbed smooth and strained.

Emulsum Amygdalæ, U.S.—*Average dose* 4 ounces. Sweet Almonds 60, Acacia Powder 10, Sugar 30, Water *q.s.* to 1,000.

Sterilised Olive (**Oleum Asepticum, L.H.**), or **Almond Oil** or **Liquid Paraffin** intended for hypodermic injection (Olive Oil for subcutaneous feeding L.H.), or lubricating catheters, is prepared by sterilising the oil in small flasks or bottles tightly plugged with cotton wool at 120°—140° C. for $\frac{1}{2}$ hour.

Physicians and Surgeons should specify which oil is to be employed for 'Sterilised Oil.'

Acidity of stomach contents is diminished by consumption of neutral liquid fats before food—the more so, the greater the tendency of the secretory activity to exceed the normal. In several degrees of digestive or continuous hyper-secretion, often associated with chronic ulcer about the pylorus or duodenum, in which heartburn, acid pyrosis, sudden gnawing pain in the epigastrium ascribed to pyloric spasm, and the vomiting of acid fluid. *Dose* of the sterilised olive or almond oil—1 ounce first thing in the morning, repeated before subsequent meals if necessary. It is also valuable as nutritive, and is well tolerated.—L. ii./09,1739.

Whooping-cough often relieved by instillation of oil into the nostrils. Systematic hygiene of the upper respiratory tract desirable, so as to inhibit growth of any micro-organism.—L. i./09,35.

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[*] P. Jap has *Prunus Macrophylla S.* and *Bakuchi* Leaves.

AMYL NITRIS (*Off.*).

Amylis Nitris, U.S., P.G., Ph. Ned., 80% pure **(Amylium Nitrosum, P. Austr., P. Belg., P. Jap., P. Hung.).** $C_5H_{11}NO_2$= 117·123.

Dose.—By inhalation, the vapour of 2 to 5 minims (0·12 to 0·3 Cc.) up to 10 minims—*Martindale.* By the mouth, ½ to 1 minim (0·03 to 0·06 Cc.). Hypodermically, 1 to 5 minims (0·06 to 0·3 Cc.).

A yellowish ethereal liquid with a peculiar not disagreeable odour; produced by the action of nitrous acid on amylic alcohol boiling between 128 and 132° C. and consisting chiefly of iso-amyl nitrite. —Sp. Gr. 0·870 to 0·880; not less than 90% distils below 212° F. Amyl Nitrite is *soluble* in alcohol but insoluble in water. Should be kept cool; by exposure to the air it becomes comparatively inert.

For Assay see Vol. II.

Incompatible. — Alkaline Carbonates, Potassium Iodide, Bromides and Ferrous Salts.

Amyl nitrite dilates the vessels and lowers blood-pressure. In 30 to 40 seconds after inhaling or swallowing a dose it flushes the face, and increases the heat and perspiration of the head and neck.

The effect on the pulse can be shown within ten seconds of inhalation. This is due to the large area of the lungs absorbing the drug—roughly 100 sq. meters—and to the thinness of the membranes (about $\frac{1}{1000}$ m.m.) separating the air of the pulmonary vesicles from the blood.—Marshall, '08.

Uses.—It has been successful in relieving angina pectoris, sea-sickness, ague, spasmodic asthma, migraine, neuralgic dysmenorrhœa, post-partum hæmorrhage, tetanus, as an antidote to chloroform, to ward off epileptic attacks, and for the spasm of false croup and whooping-cough, and in cocaine and strychnine poisoning. Is largely employed in threatened fainting and collapse, and as a restorative after gas in dental extractions.

The action of Amyl Nitrite and the Nitrites generally in relaxing arterial tension, was discovered experimentally by Rutherford and Gamgee. This led Sir Lauder Brunton to the discovery of its value and that of Nitroglycerin for relief of anginal spasm.

He first used Amyl Nitrite in angina pectoris in the winter of 1866–67. During an attack in this case the pulse became very quick and the pulse tension considerably raised. This rise of pressure he attributed to contraction of the arterioles. The success of the remedy proved the truth of the theory which led him to administer it.—L. ii./15,163. With the inhalation of Amyl Nitrite the vessels dilated and the pain passed off. It is now used for all varieties of cardiac pain, especially when it comes on in paroxysms.—H. W.

Amyl nitrite *cannot be deemed dangerous* in use in any way. Murrell writes—'A patient took a teaspoonful, vomited in a few minutes and seemed none the worse—another took 4 drachms and recovered—I know of no fatal case.'

Amyl Nitrite Sterules, *Martindale.*

Encased in cotton wool and silk; 1, 2, 3, 4, 5, 6, or 10 minims (0·06, 0·12, 0·2, 0·25, 0·3, 0·4 and 0·6 Cc.).

In use the glass capsule is broken, the liquid soaks the cotton wool and silk cover, and can be inhaled most conveniently. The 3-minim size meets most wants.

The contents of these sterules do not deteriorate on keeping. On the contrary, capsules 17 *years old were found to be fully active.*

FR. CX. has **Azotite d'Amyle.—**

"Preferably preserved in SEALED CAPSULES."

U.S. also directs to be kept in the same manner.

In ANGINA PECTORIS the best form for administration of Amyl Nitrite is the glass capsule, several may be used as there is practically no danger from its administration.—Whitla, Pract. Med., p. 51.

Pseudo-angina occurring, as a rule, in the young, not serious with regard to patient's life, and is not relieved by the Nitrites—it requires tonic treatment and exercise; true angina requires the Nitrites and Iodides. In 1867 Brunton observed that rise in tension occurred along with angina and probably caused it. He gave Nitrites early. The pain was relieved by lessening blood pressure with Amyl Nitrite.—B.M.J. ii./09,1128.

The best remedy in angina pectoris; patient's mind relieved by small doses of morphine combined with the nitrite.—L. i./90,240. Brunton.—L. ii./05,325.

CAUSATION OF ANGINA PECTORIS. A clinical lecture by Byrom Bramwell refers to this. The exciting causes to angina pectoris are increased muscular effort and conditions which produce increased pressure in the peripheral arterial circulation—that is, conditions which throw an increased strain (either actual or relative) on the left ventricle.

Clifford Allbutt lays down the good rule that everyone of forty and over should at intervals of five years or so have his blood pressure measured in order that he may know in time if he be tending towards arterio-sclerosis. A man of, say 45, in whom a systolic pressure of some 160 m.m. of Mercury be found may seem well but has probably a slight increase in amount of urine,—which will be too watery and may show a trace of albumin occasionally and probably now and then a few hyaline casts. Cut down animal proteids, give lacto-vegetarian diet, cut off excessive smoking and Alcohol, give a saline purge every morning with an occasional mercurial purge and the pressure will come down to normal or nearly so. If this is not sufficient Potassium Iodide will help. It probably helps in elimination. Not by any means a general rule, but occasionally high blood pressure may need use of vasodilators.

Vasodilators usually act even in profound cases of arterio-sclerosis, and Wallace and Ringer showed that their action is more prolonged here than in normal vessels. May be placed in following order as to speed of action and associated evanescence of effect.

Amyl Nitrite, Nitroglycerin, Spirit of Nitrous Ether, Sodium Nitrite, Erythrol Nitrate, and lastly and more lasting Mannitol Nitrate. (See also Erythrol and Mannitol).—B.M.J. ii./10,1669 see also Jl. Amer. Med. Assoc. Nov. 13, 1909.

In tobacco angina, useful.—Osler, M.A., 1911,171.

In chloroform syncope, Amyl Nitrite affords the quickest means of restoring the heart's action; and the sterules are the most convenient form of using it.

As an antidote to chloroform syncope, 3 minims inhaled.—L. ii./91,463; B.M.J. ii./88,179.

In ague, on the onset of the cold stage, 5 minims inhaled cuts short the attack and checks the recurrence of the paroxysms.

Longevity. An early recognition of excessive tension is one of the important steps towards (Hill and Barnard's and Oliver's Sphygmomanometers indicate the oscillations readily and are recommended). The systolic pressure is taken to be that which suffices to stop the pulse altogether, and the diastolic that at which the index gives the maximum oscillation. Brunton finds normal systolic 100–120 m.m. for young adults, 115–135 or 140 for men in middle life and above 150 is abnormal. To lower pressure potassium iodide and cholagogues, &c., are used, but Amyl Nitrite and isobutyl nitrite have more rapid action than any other drug and are useful in cutting short paroxysms of pain. Nitro-glycerin can be given in divided doses during the day and keeps the tension low. Erythrol Nitrate has a still slower and more prolonged action.—L. ii./06,1335.

Amyl Nitrite is sometimes said to be ineffective in angina pectoris —in such cases it is questionable whether it has been given in sufficient doses. A case is mentioned where three times the maximum B.P. dose was not sufficient to bring about the fall in pressure.—This is a case in which the spasms are very frequent and Amyl Nitrite relieves for a short time but not long enough. It is probable from the curve that the spasm is of central origin, that it is really a sort of convulsion of the vaso-motor centre.—Cushny.—"Experimental Pharmacology in regard to treatment." P.R.S.M. Therap. Sect., Nov. '10, p. 1 *et seq.*

The nitrites have been used in many cases of aortic disease for a great length of time with marked relief of urgent symptoms and with no indication of prejudicial effects.

Hæmoptysis arrested in every case in which Amyl Nitrite was tried, whether of mitral obstruction or from phthisis. Normally the effusion of blood irritates the lung tissue, causing coughing. The strain raises the blood pressure, inducing fresh bleeding. A vicious circle is in this way maintained till eventually the loss of blood becomes so great that the exertion of coughing no longer causes a marked rise of pressure, then the bleeding ceases. Amyl Nitrite accomplishes same effect without further loss of blood.—Edin. Med. J. July, 1904; L. ii./04,522,942,1446; M.A. 1906,240; B.M.J.E. i./06,79. In severe hæmoptysis—rupture of an atheromatous pulmonary vessel—free use satisfactory.—B.M.J. i./06,917.

In hæmoptysis, the general widespread vasodilation produced by Amyl Nitrite is preferable to the vasoconstriction effected by Adrenalin internally.—L. ii./04,1446.

Post-partum hæmorrhage immediately stopped by a Capsule. No further trouble followed.—B.M.J. ii./06,1125.

Hæmorrhage from bullet wounds in the chest, *e.g.*, in battle, can be controlled by inhalation of 5 minim capsule.—L. ii./07,941.

In hæmoptysis amyl nitrite acts better the quicker it is used. In most cases it can be completely arrested if inhaled as soon as the first signs of blood show themselves in the sputum. If excitement afterwards of any kind, ¼ grain Morphine given. Amyl Nitrite, the drug *par excellence*, to be used first. Especially useful in sanatorium work where the patient is seen at the beginning of attack.

In pulmonary hæmorrhage resort at once to Amyl Nitrite after ¼ grain Morphine Tartrate hypodermically. The cough slackens and hæmoptysis decreases.—J. W. Allan, Glas. Med. Jl., Nov., 1913.

In cerebral hæmorrhage Amyl Nitrite would appear to have advantage over venesection. It was found that in animals the drug stimulated the respiratory centre in addition to decreasing the blood pressure. It may be possible with this drug in man to cause a temporary fall of blood pressure without prejudicially affecting the respiratory centre as may occur with venesection. Philip Hamill, Clin. Jnl., July, '14,430.

In uterine hæmorrhage is efficient. 5 cases reported. Can be used to control flooding at periods. By dilating the arterioles generally it diminishes the peripheral resistance; thus reduces general blood pressure, and thereby the vascular distension of the uterine mucosa. May prove of value in tiding over fibroid disease until the menopause, without necessity for major operation. *Obviously patients should be prevented from using to arrest normal flow.*

In vertigo, in affections of the internal ear.—B.M.J.E. ii./07,50.

To restore animation a dose should be given in doubtful cases of death, as from fainting or drowning.

In tetanus inhale a dose in every spasmodic seizure to gain time.—L. i./09,103.

Infantile convulsions are well treated by inhalation from 1 minim capsules.—Clinical Jl. Dec. 3, 1902. 'Green,' p. 225. A whiff of Amyl Nitrite sometimes cuts the attack short.—Whitla, Pract. Med. p. 243.

Is a powerful agent to relax uterine spasms and hour-glass contraction, whether natural or caused by ergot.

In puerperal eclampsia, excretion of uric acid largely increased under its use.—Pr. xxxiv. 50.

Epilepsy well treated, controlling the fits and preventing insensibility.—B.M.J. ii./89,599,688.

In uræmic asthma, Nitrite of Amyl capsules found useful.—B.M.J. i./83,811,956,1064,1115.

Asthma is relieved by Amyl Nitrite relaxing the peripheral vasoconstriction which is an essential factor in the bronchial vascular distension responsible for the obstruction in respiration.—L. i./07, 189. Pr., Oct. 1910, p. 529. Clin. Jl., Aug. 1909.

In asthma, in most cases, the reduction of blood pressure relieves. After the relief the patient usually no longer suffers from cold hands and feet. Brilliant results follow the removal of polypi from the nose—this has a marked effect on blood pressure.—B.M.J.ii./11,1327.

In croup prompt in action.—Whitla, Pract. Med., p. 255.

In hiccough sometimes gives good results.—*ibid.*, p. 642.

Fear of death entirely disappeared as patient knew he would get relief from Amyl Nitrite or Nitroglycerin. Angina much more common amongst the rich than the poor, associated as a rule with gout.—L. ii./09,572.

In cardiac displacement. A case of severe attacks of dyspnœa which occurred every two days, a history of pleurisy. As a result of the adhesions, the heart was anchored much outside the usual position. Amyl Nitrite advised, which patient used (5 minims) during next attack, this so allowed the heart to act 'as it were being pulled right out' that it broke away from its false moorings. Patient able to bend with ease which was previously impossible. No further angina attacks which previously occurred every two days or so. Further treatment Strophanthus Tincture, which brought the heart back to normal position.—J. C. McNaughton, B.M.J. ii./12,181.

Intrathoracic aneurysm. For the acute anginal attacks—Amyl Nitrite inhalation followed by internal use of Nitroglycerin or Erythrol Nitrate $\frac{1}{4}$ or $\frac{1}{2}$ grain is generally efficacious.—F. De Havilland Hall, L. i./13,948.

Hysterical aphonia. Vasodilators (Amyl Nitrite and Nitroglycerin) used in, with success. A woman lost her voice for several days. After a few doses of Nitroglycerin 1/100 grain aphonia disappeared and did not return. A girl of 18 had been aphonic for a year with varied treatment unsuccessfully. On inhaling an Amyl Nitrite capsule her voice instantly returned. Also used *per os* with Sodium Nitrite.—J. R. Keith, B.M.J. i./15,847.

As a DIAGNOSTIC TEST OF MITRAL STENOSIS. Its action like that of exercise is to increase the flow of blood through the A—V ring which favours the production of the murmurs in question. Inhalation of a 3 m. capsule will often bring to light a clear presystolic or full diastolic murmur in a patient lying on his back, rendering early mitral stenosis diagnosable.—R. A. Morison, B.M.J. i./18,452. See also T. Fisher, *ibid*, 577.

Sterules, Hypodermic, contain 15 minims (1 Cc.). (Note the hypodermic *dose* is 1 to 5 minims.)

Amyl Nitrite in conjunction with **Pilocarpine Hair Lotion** (*q.v.*) has been used to increase the growth of the hair. Employ Amyl Nitrite 10% in Alcohol 90%. To be rubbed in the scalp alternate nights.

ANTIMONIUM.

Sb=120·2.

Antidotes to Antimony Compounds.—Stomach tube (for Tartar Emetic, but not for Butter of Antimony), emetics, tannin or tea followed by stimulants.

Accidental poisoning by. Recovery. Child was fed with milk and white of egg for the first 24 hours, afterwards barley water. A mixture of Compound Tincture of Cinchona and Tincture of Calumba was given.—L. ii./08,1013.

Impalpable powdered antimony. Patent process described; suggested for use by injection.—P.J. i./11,293 (*vide* p. 162).

Stibnite (Antimony ore) shipped from Alaska.—Mining Jl. per P.J. i./16,623.

$\boxed{\text{P 1}}$ **Antimonii Arsenas.**

Dose.—$\frac{1}{100}$ to $\frac{1}{30}$ grain (0·0006 to 0·002 Gm.) twice or thrice daily. *Max. single dose.*—$\frac{1}{30}$ grain (**0·002 Gm.**); $\frac{1}{3}$ grain (**0·02 Gm.**) in 24 hours.—M. A.

A mixture of Antimonic Oxide and 20% Arsenic Acid; a heavy white powder. Used in syphilis and skin eruptions. Nervine and muscular tonic. Is a constituent in GÉLINEAU'S DRAGÉES.

Dose of these is one twice a day, increased to three, after meals.

For further details of composition see Vol. II.

Antimonium Sulphuratum (*Off.*). A mixture of the sulphides and oxides in orange red powder.

In syphilis,—the red Sulphide most convenient.—J. C. McWalter, B.M.J. ii./14,623.

Stibium Sulfuratum Rubrum, P. BELG. *Syn.* **Kermes Minerale** is made by boiling black Antimony Sulphide (Trisulphide) with Sodium Carbonate Solution, and allowing the liquor to cool.—FR. CX. similar. **Tabellæ**, P. BELG., contain 0·01 Gm.

Dose.—1 to 2 grains. ***Incompatible*** with sodium bicarbonate and potassium acid tartrate.

Antimonii Pentasulphidum. Pentasulfure d'Antimoine, FR. CX. $Sb_2S_5=400{\cdot}7$.

Made by decomposing Schlippe's Salt with dilute Sulphuric Acid.

Antimonium Nigrum Purificatum. B.P. '98. $Sb_2S_3=336{\cdot}58$.

Greyish crystalline powder, decomposed by boiling hydrochloric acid. Used in veterinary practice as parasiticide.

Antimonii Oxidum (Antimonious Oxide) $Sb_2O_3=288{\cdot}4$.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**).

A heavy white powder, soluble in Hydrochloric Acid and in Alkaline Tartrate Solution, Caustic Potash, etc. Is expectorant and emetic.

Injectio Antimonii Oxidi.—Martindale.

Dose.—15 to 30 minims (**1 to 2 Cc.**). *Subcutaneously, intramuscularly, or intravenously, increased as required.—Vide* Refs. *infra.*

These doses contain $\frac{1}{100}$ and $\frac{1}{50}$ grain respectively in a solvent of Glycerin and Water, equal parts. *Note.*—20 Cc. contain $\frac{1}{5}$ grain Antimony Oxide $=\frac{1}{2}$ grain nearly of Antimony Potassium Tartrate.

In making the injection the Antimony Oxide in fine powder, is carefully heated with the Glycerin, taking care to prevent the decomposition of the solvent, the water being added to the glycerin solution (warm). This produces a permanent preparation.

It is to be particularly noted that it is not possible to increase the strength of the Injection when a glycerin and water solvent is used: it is practically a saturated solution. If a stronger preparation is required, the *Injectio Antimonii Fortior* below is suggested.

We have reason to believe that the preparation is not merely a solution of Antimonious Oxide, but a chemical combination in the form of **Glyceryl Antimonite** (*c.f.* Morgan, "Organic Compounds of Arsenic and Antimony," 1918, p. 295).

Uses.—It will be noted with regard to content of Antimony in the dose that the amount suggested has been on the side of caution, and though even with these small quantities the preparation has proved effectual in Leishmania infections, and trypanosomiasis, nevertheless stronger doses could undoubtedly be tolerated and in infections by parasites of the nature of Bilharzia, would be as effectual, if not more so, than Antimony Potassium Tartrate, which has been so successful in ½ to 2 grain doses. The literature, however, shows, *vide infra*, that the preparation in dose equivalent to even 1/20th grain Tartar Emetic is active. This is of great importance when treatment has to be extended over long periods.

For these diseases and others where bold dose and concentration is wanted we have introduced **Injectio Antimonii Oxidi Fortior.** In these Glycerin Injections the Antimony is in a labile condition and hence *reactive*—a body of the nature of **Glyceryl Antimonite** is more easily broken up than, for example, Antimony Potassium Tartrate or Antimony Sodium Tartrate where the component radicals are strongly linked together.

It would be of interest to try the preparations in syphilis and in malaria. It is obvious that there can be little danger through lack of knowledge of the effects of the component parts of the injection—we have here simply Antimony Oxide, Glycerin and water (or pure glycerin in the case of the stronger preparation). The position is very different in the case of an organic arsenical. Without wishing to labour the point, it may be hinted that the diphenyl nucleus, to take a concrete example, in a body like Arsenobenzol in its breaking down in the blood stream may be the portion of the dose which is *not* always '*bene tolerata.*'

The following are recent abstracts from papers which have appeared :—

C. W. Daniels and H. B. Newham pointed out that successful treatment of these tropical protozoal infections (trypanosomiasis, etc.) entails keeping the disease under control possibly for two years A case of Rhodesian trypanosomiasis was first treated with atoxyl subcutaneously and antiluetin *per os.* Trypanosomes were easily found in peripheral blood and varied from 1 or 2 to 20 per 200 leucocytes. Antimony Potassium Tartrate intravenously was given and for two or three days afterwards no trypanosomes were seen, but they recurred to the extent of 6 to 24 per 200 leucocytes on the 3rd or 4th day.

From December 8th, 1915, 2 Cc. of the Injectio Antimonii Oxidi were given (= 1/20 grain Tartar Emetic) daily subcutaneously and no trypanosomes were found until the 14th (2 per 200 leucocytes) and on the 15th, 3 per 200 leucocytes. On the 16th 2 Cc. of the injection were given twice a day and no trypanosomes were found for a fortnight (the date of the letter).

These subcutaneous injections are painless and can be repeated and cause no trouble whilst intravenous injections are of the nature of an operation to the patient and continued intravenous injections are painful—extended use of the preparation is thought well worth while.—L. i./16,102.

Trypanosomiasis. "The preparation is good and practically painless" for this and in the treatment of Kala azar and oriental sore.

Thought curative action inferior to Tartar Emetic, but details of *extent* of treatment are wanting in the paper. Further, comparison is made apparently between 2 Cc. doses of the Oxide Injection (containing 0·0013 Gm. of Oxide) and 2 to 10 Cc. of 4% Tartar Emetic. —A. Castellani, B.M.J. ii./16.552 *et seq.*

Dr. Escomel (Arequipa, Peru) writes as follows:—

American leishmaniasis has in the past been treated by injecting Antimony Potassium Tartrate intravenously. For the treatment of furunculosis orientalis and Kala azar, injection of Antimony Oxide has been suggested as worthy of trial. It is non-caustic and keeps well.

I have tried the preparation in cases of American leishmaniasis with promising results. The injection may be subcutaneous, intramuscular or intravenous, the last mentioned being the most rapid. I have given *from 1 to 2 Cc. on alternate days or from 5 to 6 Cc. of the solution weekly.* The former method (alternate days) appears to have a more lasting effect.

No local or general reactions were observed notwithstanding that the injections were made at the surgery, whence, after a quarter of an hour's rest, patients returned home. This procedure is not possible with Tartar Emetic. No bad effects are produced beyond a certain amount of pain which is transient.

In certain cases the treatment has been supplemented by local treatment with Tartar Emetic powder on the wound. Cicatrisation of all cutaneous lesions and of most of the mucous lesions was effected in one case by the Antimony Oxide Injection and the external action of Tartar Emetic, while extensive ulceration on the foot in a case of long standing healed completely under the Injection, without local treatment other than the applcation of Zinc Oxide ointment.

Ulceration in a further Leishmania case invaded the whole nasal mucous membrane, the roof of the mouth and the back of the palate. It had existed six months before Antimony Oxide treatment was started. On the 10th September, 1916, the first dose (1 Cc.) was given subcutaneously without untoward reaction. Then at intervals intramuscularly, intravenously and subcutaneous doses of 1 to 2 Cc. Cicatrization commenced after three months and patient improved. Subsequently 6 Cc. were given intravenously on two occasions. No fever or local reaction. Cure of facial cutaneous region complete. Further doses effected cicatrisation of the mucous lesions.

The preparation clearly has advantages over Tartar Emetic and has cured American leishmaniasis, but was not successful in a case of blastomycosis in which latter Tartar Emetic also failed.—Esmundo Escomel, L. ii./17.355.

Dr. Escomel reported further (L. i./18,592) on four fresh cases successfully treated with the Injection:—

(1) A Spaniard aet. 38 with leishmaniasis lesion on the nasal septum and the forearm. Cured by 1 to 2 Cc. injections until a *total* of 30 Cc. had been reached with local treatment by tartar emetic (saturated solution).

(2) Peruvian aet. 22. Initial lesion two years ago at the lower and external part of the leg. Intense lesions of the entire mucous membrane of the nose and mouth. He received a *total of* 58 *Cc. of the Injection intravenously with apparent cure.* He continues the treatment in order to avoid relapses.

(3) Peruvian aet. 23. Ulcer on foot. Mucous membrane of the nose, mouth and tonsils much ulcerated. *After a total of* 35 *Cc. of the Injection, patient considers himself cured.* Two months afterwards there was a relapse commencing on the foot and in the mouth. After a few injections the ulcers healed, but we continued the injections as precaution until 80 Cc. of the injection had been given intravenously.

(4) Peruvian aet. 20. Leishmaniasis of the contour of the ear 15 *Cc. of the Injection intravenously* (1 *or* 2 *Cc. per injection*) and two applications of saturated solution of tartar emetic effected cure.

Professor P. W. Bassett-Smith employed the injection in a case of trypanosomiasis. The dose employed to begin with was 4 Cc. (containing $\frac{1}{25}$ grain of Oxide) increasing to 12 drachms (42·6 Cc.), (containing $\frac{2}{5}$ grain); this was given as an intravenous injection once a week.

As this involved the injection of a considerable quantity of solution, a more concentrated preparation was employed, viz., 1 grain (0·06 Gm.) in 4 Cc. of pure glycerin. This was diluted by him four times, viz., to the proportion of 1 grain (0·06 Gm.) in 16 Cc. Of this 2·5 Cc. (=$\frac{1}{6}$ grain Antimony Oxide approx.) were given *intramuscularly* without ill effect.

The object was to give the concentrated intramuscular dose alternately with the intravenous one—the latter has the highest sterilising effect on the blood, but it is not so lasting for killing off "hidden away" trypanosomes.

Injectio Antimonii Oxidi Fortior—*Martindale.*

Suggested dose, to be used with extreme caution, **diluted.** *See Animal Experiments, p.* 155.—8 to 15 minims (0·5 to 1 Cc.) subcutaneously or intramuscularly.

Strength 2% w/v, i.e. 0·02 Gm. in 1 Cc. or 1/3rd grain in 15 minims. 1 *Cc. is equivalent to* 0·05 *Gm.* ($\frac{3}{4}$ *grain approximately*) *Antimony Potassium Tartrate.*

Chemical and Physiological Note.—The antimony, as already stated, is in a relatively loosely combined condition and hence *reactive.* On dilution with blood serum it is admitted a reduction takes place. Nascent Antimonious Oxide will be precipitated in a fine state of subdivision—ready for immediate reaction with the infective parasites, the tissues and the body fluids. We note that L. E. W. Bevan, Govt. Veterinary Bacteriologist to S. Rhodesia (L. i./18,304) did not obtain success wlth a *suspension* of Antimony. Oxide in the treatment of a trypanosome infection in animals. We should have been surprised if he had. It is stated that 0·5 Gm. was given in suspension (how suspended is not stated) to pigs and sheep and 2 Gm. to the ox without harmful effect. In our opinion it would pass through the system practically unabsorbed or be deposited as a foreign body and probably ten times the quantity would be equally useless. The essence of the injection is that it is a *solution* or chemical combination from which the Antimony Oxide is precipitated in a nascent condition ready for immediate reaction with the parasitic infection.

L. Rogers, L. i./19, 605 gave Antimony Oxide in pill form in kala-azar relying on its solubility in the Hydrochloric Acid of the stomach but this is not satisfactory—small doses would not produce the necessary intensive action and large doses *per os* would cause violent vomiting by its direct action on the stomach lining. And as to the 'solubility' we shook 5 Gm. in 500 Cc. of Physiological Acid and determined that the amount dissolved was exceedingly small.

Uses.—This preparation is now brought to more prominent notice, to permit of the use of bolder doses of Antimony Oxide in Glycerin combination, on the lines of the recent treatment of trypanosomiasis and Bilharzia infection where 1 to 2 grain doses of Antimony Potassium Tartrate are commonly given.

ANIMAL EXPERIMENTS.

Intramuscular injection of the undiluted preparation in dose of 0·4 Cc. in a cat was exceedingly irritant. The animal salivated slightly but did not dribble.

On the following day two injections (0·5 Cc. each) were given under ether and proved also unsatisfactory.

In another cat 1·0 Cc. diluted with an equal volume of water was better borne than was the undiluted injection by the first animal. Effects similar to the first.

Suppuration occurred in each case.

The conclusion to be be drawn from this report to hand May 11, 1920 (for which we had unfortunately to wait 5 months) is that 2% strength in its present form does not appear suitable for injection in man in dose of 0·5 Cc., but it will be noted (p. 154) that the same content of Antimony Oxide ($\frac{1}{6}$ grain or 0·01 Gm.) in 2·5 Cc., or in round numbers *five times* the amount of diluent, was tolerated in man intramuscularly. *Caution in the treatment is necessary.* The investigation will be proceeded with. The extent of dilution appears to be an important factor.

There is reason to believe that a preparation on these lines, when further knowledge has been gained, will be found worthy of trial as a parasiticide in Leishmania infections, trypanosomiasis, bilharziosis, and possibly also in syphilis and malaria.

Injectio Antimonii Cinnamica.—**Martindale.**

Dose.—15 to 30 minims (1 to 2 Cc.).

Thirty minims contain Antimonious Oxide $\frac{1}{50}$ grain, with Sodium Cinnamate 1 grain in a mixture of Glycerin and Water, equal parts. Percentage parts—0·073 and 3·7 approx. respectively.

Hypodermic Sterules of all the above, both 15 and 30 minims in each, are prepared.

These preparations are also employed in malignant disease by injecting into the mass of the tumour.

Elixir Antimonii Cinnamicum is intended for internal administration.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Containing Antimonious Oxide $\frac{1}{10}$ grain, Glycerin Sodium Cinnamate 3 minims, Cinnamon Water to 2 drachms. Percentage parts: 0·092 and 2·5 approx. respectively.

Antimony and Opium, useful remedies in treatment of many chest affections.—*e.g.*, in bronchitis.—B.M.J. Apl. 18, 1908.

P1 **Antimonium Tartaratum.** (*Off.*). *Syn.* TARTAR EMETIC. Antimony Potassium Tartrate. FR. CX. 'EMÉTIQUE.'

P1 "*And all preparations or admixtures containing* 1 *or more per cent. of emetic tartar.*"

$[K(SbO)C_4H_4O_6]_2,H_2O$=664·721.

Dose.—Diaphoretic $\frac{1}{25}$ to $\frac{1}{8}$ grain, emetic $\frac{1}{2}$ to 1 grain.

FR. CX. has *max. single dose* 3 grains; max. in 24 hours 9 grains.

Colourless crystals made by combining Antimonious Oxide with Acid Potassium Tartrate.

Soluble 1 in 17 of cold water. Almost insoluble in alcohol 90%. ***Incompatible*** with acids and alkalis, soap, and tannin

Uses.—Diaphoretic and emetic.

In chorea in children is less dangerous as emetic than apomorphine.—M.A. 1906,155.

In acute bronchitis there is no remedy that possesses such a decided power.—Stokes.

Pulvis Antimonialis. (*Off.*). JAMES'S POWDER.

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

Contains 33⅓% Antimonious Oxide.

Ⓟ**Pilula Antimonii Conii et Quininæ.**

Dose.—As required in fever.

James's Powder 1 grain, Conium Extract 2 grains, Quinine Sulphate 2 grains. A pill on the lines of this formula had a reputation in Italy for treatment of malarial fevers. A most successful pill used in a variety of febrile conditions.—Drage.

Ⓟ**Vinum Antimoniale** (*Off.*).

Note. Ⓟ'*Preparations or admixtures containing Antimonial Wine.*'

Dose.—10 to 30 minims (**0·6 to 2 Cc.**); as emetic 2 to 4 drachms (**8 to 15 Cc.**); contains 1 in 250 by volume.

Flavoring.—It has little taste when diluted.

Pharmacological action of Antimony in treatment of bronchitis. The dry membranes become flooded with healing serum.—*c.f.* Emetine and Potassium Iodide.—P.R.S.M. Therap. Sect. 1911, p. 41.

Pneumonia is well treated by repeated 2½ minim doses of Antimonial Wine. Crisis comes at the end of the fourth day.

In ***sleeping sickness*** Tartar Emetic and **Antimonyl Sodium Tartrate** (*vide infra*) are given intravenously, as hypodermically they are too painful. The method alone (without Mercury or some other powerful adjuvant) is not effective, it drives the trypanosomes from the blood, but they still remain in the cerebro-spinal fluid.

Syphilis. Monkeys can be rendered immune to the disease by injecting organic compounds of Antimony, but inorganic compounds, *e.g.*, Metallic Antimony and Sodium Antimonate, were ineffective.

Dose.—¾ to 1 grain (**0·05 to 0·06 Gm.**) of Tartar Emetic intravenously daily, increasing gradually to 1½ grains (**0·1 Gm.**).—L. i./09,727.

Syphilis in man treated by intravenous injection of Tartar Emetic in 1 in 1000 Solution made isotonic by using Normal Saline Solution. A daily dose for 11 to 12 days of 0·1 to 0·12 Gm. without causing inconvenience. As a rule well borne. Greatly improves certain cutaneous manifestations, but has no specific action on the progress of the disease.—L. i./09,1080.

In TRYPANOSOMIASIS, espundia, granuloma inguinale, Kala-azar and oriental sore, tartar emetic has powerful action. Efficacious also in yaws (with other drugs) and beneficial in relapsing fever.

Intravenously 1% solution in sterile Normal Saline used in 2 to 10 Cc. doses daily for 5 to 10 days, then every other day or twice a week.

Castellani's Injection of Antimony Potassium Tartrate (Intramuscular).

Form No. 1.

Dose.—½ to 1 Cc. every other day in the gluteal regions.

Antimony Potassium Tartrate 8 grains, Carbolic Acid 10 minims, Glycerin 3 drachms, Water to 1 ounce.

Form No. 2. contains ⅓ grain Sodium Bicarbonate in addition.

Both these produce some pain a few hours after administration.

Mistura Antimonii et Potassii Iodidi (*Castellani*).

Dose.—One ounce diluted with 3 or 4 times the quantity of water thrice daily, for adults ½ doses for children of 8–14 and for European patients.

Antimony Tartrate 1 grain, Potassium Iodide 1 drachm, Sodium Bicarbonate 15 grains, Sodium Salicylate 10 grains, Glycerin 2 drachms (or Syrup 1 drachm or Sodium Tartrate 10 grains), Water to 1 ounce.—A. Castellani, B.M.J. ii./16.552.

It is possible that on standing this mixture may deposit Antimonious Oxide, but a bottle of it which we prepared remained clear for a reasonable time. All the ingredients must be pure (the presence of Caustic Alkali will cause deposition) and each of the salts must be dissolved separately in a glass mortar *in as much water as possible before mixing.*

CEREBRO-SPINAL FEVER benefited by ½ grain dose intravenously. A daily remitting temperature fell to normal in 60 hours and remained so.—S. Neave, L. i./16,1101.

KALA-AZAR well treated by Tartar Emetic injections intravenously. *Dose.*—Commence with 4 Cc. of 2% solution and gradually increase up to 10 Cc. Excellent results.—L. Rogers, L. ii./16,782. Except for melancholia and depression no toxic effects.—H. I. Winifred Kerr, L. ii./18,45.

Kala-azar treated in like manner starting with ¼ grain and rising with two or three days' interval to 2½ grains. Total given 64¾ grains. The case died of influenzal pneumonia and permitted examination of all the organs determining that complete sterilisation of the system had occurred so far as *L. Donovani* was concerned. Given in large doses over long period Antimony produces fatty changes in the liver and kidneys. The solution should not be too concentrated. Antimony Potassium Tartrate is evidently a specific against *L. Donovani.*—G. C. Low, B.M.J. i./19,702.

MALARIA. According to Sir L. Rogers, although Quinine kills the malarial parasite in the blood, there is something that remains, and in certain cases of ague malignant tertian crescents are found in the blood, and as long as they are there the ague continues. He gives particulars of several cases where Tartar Emetic in doses of 4 to 10 centigrams was intravenously injected and the crescents disappeared. Further trials should show whether this method is really successful in curing malaria or in removing the infectiveness of patients treated with Tartar Emetic.—B.M.J. i./17,6. The Tartar Emetic treatment appears to have been abandoned by him subsequently.—See *ibid.* ii./17,382.

Utility of Tartar Emetic intravenously (one grain doses) in malaria as advised by L. Rogers found to be *nil.*—A. Powell and F. D. Bana, B.M.J. i./17,858. See also G. C. Low and A. B. Newham, *ibid.* 295.

Eight cases treated by Tartar Emetic intravenously. Doses up to 4 Cc. of 2% solution (with ½% Phenol). No effect on parasites circulating in the blood nor permanently on the temperature.—A. W. Falconer and A. G. Anderson, L. ii./17,743.

In malaria, utility of Tartar Emetic injections, partially confirmed in South Africa.—L. ii./17,397.

BILHARZIOSIS successfully treated by Tartar Emetic intravenously. For children ¼ grain, for adults ½ grain. A total of 30 grains or more is required lasting over 15 to 30 days. The dose is dissolved in 20 minims of distilled water and this diluted with 2 volumes of distilled water at time of use. It should be remembered that even small doses have been known to cause death (½ grain in a child and 2 grains in an adult. Care and judgment are necessary.—J. R. Christopherson, L. ii./18,325. See also B.M.J. ii./18,652.

Bilharziosis, seventy cases, treated by Antimony Potassium Tartrate at Khartoum Civil Hospital. A very complete treatise on Bilharzia infection in general. The solution used is ½ grain in 20 minims of distilled water diluted with an equal quantity of Normal Saline solution. It is thought to be the only drug with any direct effect on the disease. The dose (given every other day) is increased by ½ grain every injection until 2 or 2½ grains have been reached and this is maintained. (In the case of boys of 16 or under 1½ grains is the maximum). The total quantity injected would be 20 or 25 grains according to circumstances. If more than 25 grains is required, the surplus needed should be reserved for a second course. When the dose is 1½ or 2 grains (sometimes before), a cough immediately on injecting indicates that the Antimony is already in the pulmonary circulation and shows that the drug is both rapid and far reaching in its action. Two notable changes occur during the course of injections: disappearance of red blood from the urine but microscopic blood (smokiness) remains till later. The second change (after about 20 grains have been given) is that the urine apparently becomes clear and normal. These changes may coincide with the closing activities of the worm. Daily estimations of the Antimony eliminated during a course show that a third of the total amount of the Antimony given is eliminated. The cumulative action of Antimony may have been over-estimated by the older writers. Bilharzia infection in Egypt on physique and character is disastrous, the backward condition of the peasant (who constitutes 90% of the population) is attributable to this scourge.—J. B. Christopherson and J. B. Newlove. —Journal of Tropical Medicine and Hygiene, July 15th, 1919, pp. 129–144.

Not only is the parasite *Schistosoma Hæmatobium* killed *in situ* by the method but later the embryos in the ova deposited in the terminal vessels are killed and the patient therefore ceases to be a carrier

The Egyptian Fellaheen do not know they are infected. The parent worms, often many hundreds, are situated in the portal vein and its tributaries. The ova working their way from the venule to the surface of the bladder and rectum in order to escape with the urine or fæces may take months to do so. An ordinary uncomplicated case lasts 10 years or more. *S. Hæmatobium* lives for that length of time or longer. Hitherto it has been thought that " no direct or other means is known by which the parasite can be destroyed " (Manson, Trop. Dis., 1918). Christopherson holds there *is* a cure. After about 12 grains have been given in as many days *some* of the ova are shrunken, shrivelled, blackish, etc., and they do not later hatch out in water. When this point is reached the parent worm is held to be killed in the portal circulation and the ova sterilised *in situ.* The patient ceases to be a carrier after about 20 grains. The Antimony Injections should only be given with greatest caution when any important organs—kidneys, liver, heart, lungs, etc.—are not sound.—J. Christopherson, L. i./19,1021.

Bilharzial infection treated by Tartar Emetic—supports Christopherson's findings.—A. Innes, B.M.J. ii./19,340. Up to 2 grains intravenously as dose —J. G. Cawston, *ibid.* 380; see also Christopherson, *ibid.*, 494, and F. E. Taylor, L. ii./19,246; Christopherson, *ibid.*, 299.

American Leishmaniasis of the skin treated by Antimony Potassium Tartrate beginning with ½ grain, increased to 1 grain—six injections during 14 days. Then a second course starting with 1 grain and gradually increased to 2½ grains—22 injections in this second course spread over ten weeks—total 47 grains of Antimony. Each dose was dissolved in 2 ounces of normal saline and sterilised. Cure.—G. C. Low, B.M.J. i./19,479.

Antimonii et Sodii Tartras. **Antimonyl Sodium Tartrate.** $[Na(SbO)C_4H_4O_6]_2H_2O=632{\cdot}520$.

Manufacture.—Boil Antimonious Oxide 10 in a solution of Sodium Acid Tartrate 13 until almost clear (the quantity of Antimonious Oxide is purposely in slight excess). Filter and evaporate to dryness. When dried at 105° C. the substance retains ½ H_2O. Plimmer has shown that by adding alcohol to the concentrated solution the compound crystallises out with 2½ H_2O. There is no great advantage in this method. Furthermore, we have found that much of it remains in the mother liquor. The body is in white crystalline powder. *Solubility* 1 in 1½ of water.

In the experimental treatment of trypanosomiasis in rats a number of drugs were tried including this compound. A rat, whose blood was teeming with trypanosomes, after 0·35 Cc. of a 1% solution of this drug showed complete disappearance of trypanosomes from the blood in half an hour.—Ninth Report of the Sleeping Sickness Commission of the Royal Society.

0·5 Cc. of 1% solution per Gm. weight of rat is considered maximum dose. Its quickness of action is remarkable. A few very persistent forms can still be found in the liver. They need to be tired out by successive doses.—Plimmer and Thomson, Roy. Soc. Na. Jan. 9, '08,238. L. i./09,778.

Experiments to determine the resistance of the trypanosome of sleeping sickness to Antimony, Arsenic and Bismuth showed that of each 1 in 200,000 was sufficient to banish the parasite. 1 mgr. of Antimony destroyed the parasites in a 200 Gm. rat. Arsenic acted more slowly and in the case of Bismuth the damage done to the host was generally irreparable. The trypanosomes, however, not permanently destroyed—they return in course of time, and ultimately antimony and arsenic-resistant trypanosomes are produced and retaining this property can be propagated from rat to rat—the arsenic resistant trypanosomes are still susceptible to Antimony and Bismuth. Suggestion to treat patients with all three drugs at once; —Cushny, L. i./09,239.

In kala azar the compound has also been tried.

Filariasis treated by this compound.—L. Rogers, L. ii/19,604 *See also* B.M.J. i./20,596.

Further Organic Antimony Compounds.

Prof. G. T. Morgan's new work on "Organic Compounds of Arsenic and Antimony" (Longmans, 1918) provides valuable information on these bodies, and should be consulted.

p-Amino-phenyl Stibinic Acid—the Sodium Salt of which is the Antimony Analogue of Atoxyl is patented—Von Heyden, D.R.P., 254,421, J.S.C.A., i./13,416.

Acetyl-p-Amino-phenyl Stibinic Acid is sparingly soluble in water but readily in Alkali Hydroxides and Carbonates, has been tried on tumours of rats and mice.—Uhlenhuth Med. Klinik, 37, 1912. See also Hügel D. Med. Woch. 50, 1913.

Kala-azar and Leishmaniasis were treated by doses up to 0·2 Gm. of Sodium Acetyl-p-aminophenyl Antimonate—efficacious, easily absorbed and relatively non toxic.—G. Caronia, 1906, per T. Vincent Dickinson.—L. ii./19,457.

Antimony Analogue of Salvarsan.—Steps towards manufacture—Von Heyden's Patents, D.R.P., 259,875; 261,852 *vide* J.C.S.A., i./13,1122.

The Sodium (*v. antea*) and Potassium Antimonyl Tartrates are very nearly equal in efficiency. Ethyl Antimonyl Tartrate appears to have some advantage over the Alkali Salts. (This was tried alone and with Atoxyl.) Fewer recurrences when the two were used, but mortality from poisoning higher. Possibly more accurate adjustment of the quantities of the two drugs might combine the advantages of each.—J.C.S.A. ii./10,330. Thomson and Cushny, Proc. Roy. Soc., 82 *B.* (1910),249, prepared and tried a number of bodies without obtaining any satisfactory result in trypanosomiasis.

Antimonii et Ammonio-Potassii Tartras. *Syn.* Antiluetin.

$SbO.(C_4H_4O_6)_2.K(NH_4)_2+H_2O$=525·504 (—? formula *vide infra*).

Dose.—Subcutaneously $\frac{3}{8}$ grain (**0·025 Gm.**), increased to $\frac{3}{4}$ grain (**0·05 Gm.**). ***N.B.****—This is as stated by Tsuzuki* but *we should advise less* to start with in general treatment (*vide experiments infra*, also Antimonyl Sodium Tartrate).

Small prismatic crystals resembling Antimony Potassium Tartrate.

Soluble in water, readily—approx. 1 in 17.

Uses.—Has been tried in syphilis, but not completely satisfactory (*vide* refs.).

This Compound according to the above published formula is clearly composed of 1 molecule Anhydrous Antimony Potassium Tartrate with 1 molecule Neutral Ammonium Tartrate. On proceeding on these lines we did not obtain this substance, but a body apparently of formula—$(SbOC_4H_4O_6)_2KNH_4.H_2O$ (or 3/4 H_2O), thus:—

$$2\ SbOK\ (C_4H_4O_6) + 2\ (NH_4)_2(C_4H_4O_6)_2 = (SbO.C_4H_4O_6)_2KNH_4 + NH_4KC_4H_4O_6 + (NH_4)_2C_4H_4O_6.$$

In other words, only 1 molecule Ammonium Tartrate is required to 2 molecules Antimony Potassium Tartrate.

Other processes were tried to produce Tsuzuki's Compound, but were unsuccessful.

The formula $(SbO.C_4H_4O_6)_2KNH_4.H_2O$=643·662, contains 37·35% Antimony Metal as against 22·87% for the formula previously stated. We found experimentally 38% Antimony in the first crop of crystals, but subsequent crops varied in Antimony content between 38 and 34%.

Pharmocological Experiments with Injection of Antimony Ammonium Potassium Tartrate (2·5%) which we have had specially conducted showed as follows:—

RABBIT 1. WEIGHT 2·6 KG.

Day.	*Dose.*	*Effect.*
1 ..	0·2 Cc. subcutaneously ..	.. Nothing noticeable.
4 ..	0·3 Cc. subcutaneously ..	.. Nothing noticeable.

RABBIT 2. WEIGHT 3·0 KG.

1 ..	0·4 Cc. subcutaneously ..	.. Nothing noticeable.
4 ..	0·6 Cc. subcutaneously ..	.. Nothing noticeable.
10 ..	2·0 Cc. intravenously ..	.. Became unconscious
11 ..	None. Found dying. Slaughtered	

CAT 1. WEIGHT 2·8 Kg.

Day.	*Dose.*	*Effect.*
1	0·2 Cc. subcutaneously	Nothing noticeable.
4	0·6 Cc. subcutaneously	Slight salivation.
8	1·0 Cc. subcutaneously (solution turbid).	No salivation, but loss of appetite.
10	1·0 Cc. subcutaneously (fresh solution).	Slight salivation, no vomiting, ate little.
11	None. Found dead.	

CAT 2. WEIGHT 2·3 Kg.

Day.	*Dose.*	*Effect.*
1	1·0 Cc. subcutaneously	Slight salivation.
2	No injection	Appetite poor, vomited.
5	No injection	Apparently recovered.
6	1·0 Cc. subcutaneously	No noticeable salivation, no vomiting, became drowsy.
7	No injection	Very lethargic. Ate little.
8	None. Found dead.	

CAT 3. WEIGHT 2·3 Kg.

Day.	*Dose.*	*Effect.*
1	2·0 Cc. subcutaneously	Became unconscious. Some convulsions.
2	None. Found dead.	

These observations show that the m.l.d. for an adult cat is in the neighbourhood of 1 Cc. of a $2\frac{1}{2}\%$ solution, and therefore a single dose of 1 Cc. is not dangerous to man. This dose is 0·025 Gm. ($\frac{3}{8}$ grain approx.) for a 2 kilo cat, *i.e.*, equivalent to 0·75 Gm. (say 12 grains) for a 10-stone man. The experiments do, however, suggest that repetition of this dose might prove dangerous, and that *warning of danger might not be afforded either by salivation or by vomiting.*—Dec. 1914.

To us it seems remarkable that the compound is tolerated in so large a dose by an animal, and it does not necessarily follow that the dose for the human being can be reckoned weight for weight by rule of three in this manner.

References.—J. E. R. McDonagh employed Tsuzuki's Antiluetin. 12 injections were given, commencing with 0·025 Gm. with Cocaine Hydrochloride 0·025 Gm. in 1 Cc. of Water. Intramuscularly often painful, syphilitic lesions disappeared, but not so quickly as under Salvarsan. Intravenously not so good as the latter. In some cases did not seem to act any better than intravenous injections of Tartar Emetic.—B.M.J. ii./13,1512.

It is stated that the quantity to ensure sterilisation for man is 0·75 Gm.—the nearer this amount can be reached by successive small doses the more certain the cure.—P.J. ii./13,20, *q.v.*, also for further references.

Increase dose daily or every other day from 0·025 to 0·05 until a total of 0·15 to 0·3 Gm. has been reached. If well tolerated give a further series.—Tsuzuki, Deut. Med. Woch. 1913, p. 947; B.M.J. ii./13,1449.

Antimony Salts are not so powerful in syphilis as the Arsenic Compounds. The reason why Spirochætes vanish so quickly after Salvarsan is that they contain free OH groups, since in their colloidal lipoid membrane an unsaturated fatty acid exists. (Presumably a free acid, *i.e.*, with a Carboxyl OH—not "unsaturated," as usually understood.—W. H. M.) It is to these OH groups that the metals become attached, with the result that the organisms perish. The other phases (*c.f.* syphilis, Vol. II. for ? existence of a life cycle) of the

Leucocytozoon Syphilidis have no free OH group—they are probably destroyed by enzymes helped by Arsenic or Antimony.—J. E. R. McDonagh, B.M.J ii./13,1512.

The revival of the use of Antimony is a triumph of rational therapeutics, for it was through reasoning from its chemical affinities that Cushny and Plimmer were led to try the remedy in diseases dependent on protozoal parasites. *The control of trypanosomes by Antimony* and Arsenic given together and in alternation is as striking as the cure of malaria by Quinine. Antimony in the form of Antiluetin (Antimony Ammonium Potassium Tartrate) has been tried in syphilis with good results.—L.i./17,307.

For further information on recently made Organic Antimony Compounds, vide Vol. II.

Intramuscular Injection of precipitated Antimony in trypanosomiasis. *Dose* of 10 minims=½ grain of Antimony in Lambkin's oily medium, *i.e.*, 5% suspension, was followed immediately by severe local pain. Symptoms lasted two weeks. Morphine had to be freely used. Patient was, however, then able to walk.

Intravenous Injection of Antimony Sodium Tartrate 1/6 grain in Normal Saline into a vein of the arm. 13 injections given with intervals of about 4 days or more. On the thirteenth injection, however, severe symptoms supervened,—chill and violent abdominal pain, and later intense headache, temperature 103·6,—this lasted 5 to 6 hours. Simultaneously **Antimonyl Lithium Tartrate** 1½ to 2 grains (in 3 pints of water) *per os* daily. This treatment, however, reduced the trypanosome fevers and apparently freed the peripheral blood from trypanosomes,—and no recurrence during 1½ years.—B.M.J. ii./11,104.

Antimony is a more powerful trypanocide than arsenic, and such compounds as were tried by Fry and Rankin have not shown such severe toxic effects as some arsenic compounds have. But sloughing and necrosis at the seat of injection and severe pain, are caused by some. Finding that in dogs the subcutaneous and intramuscular administration of certain salts caused pain and sloughing of the tissues, intravenous injections of the salts were tried. The elimination of the antimony was so rapid, however, that, beyond prolonging life, little good effect was produced; so that eventually the injection of the **Metal** itself, in state of finest division was tried. This is taken up by the leucocytes, and is gradually changed into some soluble compound, and it was thought that it might be carried to parts of the body not easily accessible to other methods of administration. The results so far have been, on the whole, more satisfactory, but the technique in many animals is difficult. Although putting a metal into the circulation sounds impossible, they have not had any case of plugging of capillaries in rats, guinea-pigs, rabbits, dogs, goats, or horses. It acts much more slowly than the salts, and takes from two to three times as long to clear the peripheral circulation of trypanosomes as subcutaneous injection of a salt does. But the excretion is also much slower, so that the blood and organs are in much longer contact with antimony than when a salt is administered. If carefully administered no irritation of the tissues is produced and the vessel walls are not affected. Animals appear to be more susceptible to overdosage than with the salts, and it is curious that an animal with trypanosomes in the blood can bear well a dose which is fatal to a healthy animal.

See also Plimmer & Fry, Proc. Roy. Soc., 81 B. (1909) 334. Plimmer, Fry & Ranken, Proc. Roy. Soc. 83 B. (Dec. 1910) 140.

Capt. Ranken reports treatment of human trypanosomiasis and yaws with Metallic Antimony. As a routine dose, 1 grain of Antimony in 4 to 6 ounces of Physiological Salt Solution, considerable improvement.—Nature, Feb. 13, 1913.

Unguentum Antimonii. We have made this ointment containing 5% and upwards of finely powdered Metallic Antimony in a basis of Lanolin Ointment for use in skin affections.

Antimonyl Aniline Tartrate. *Syn.* ANILINE TARTAR EMETIC, $C_4H_5O_6(SbO)C_6H_7N.H_2O=396{\cdot}372$. White crystals soluble 1 in 7 of water. This substance is stated to be less toxic than the ordinary Tartrated Antimony, introduced as a remedy for sleeping sickness.—Pharm. Zeit. 1909, 54, 919 per P.J. i./10,28.

P. Yvon gives the following method of preparation. Tartaric Acid 150 are dissolved in boiling water 1,000 (on a water bath), Aniline 93 are then added. After combination Antimonious Oxide 280 are added. The mixture is then kept at 100° C. for an hour with constant stirring. Filter and crystallise at ordinary temperature. As a half-molecular proportion of the Antimony Oxide enters into the reaction—half the quantity could be used, *i.e.*, 140.

Injections of a 1% solution in doses of 0·1—0·2 Gm. of the Salt.—F.N. 1911.

TRIPHENYL ANTIMONII SULPHIDUM. $(C_6H_5)_3SbS=383{\cdot}48$.

A white crystalline powder. Tasteless, odourless and insoluble in water or alkali, easily soluble in Chloroform, only slightly in Alcohol and Ether.

A 10% solution is made in Olive Oil with a little petroleum ether, also 5 to 10% ointment.

For skin affections, especially alopecia. Liberates sulphur in *statu nascendi.*

Linctus Expectorans.

Dose.—½ to 1 drachm (**2 to 4 Cc.**). Sulfidi Stibici (Antimonii Sulphurati) 2, Syrupi 450, Aquæ Amygdalæ Amaræ 50. To be shaken before administering. Said to be of value for cough Ph. Notes.—Denmark

Antimony Crocus.—For veterinary use, is a mixture of Tri-oxide (about $\frac{4}{5}$) and Tri-sulphide ($\frac{1}{5}$). Formed by heating equal weights of Antimony Tri-sulphide and Potassium Nitrate to which $\frac{1}{12}$ of Hydrochloric Acid has been added.—U.S.D.

APIOL.

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**), in **Perles,** 3 minims in each, or **Capsules** 3, 5, and 10 minims.

A liquid preparation obtained from, and containing the active properties of, the fruit of *Apium Petroselinum. Syn. Petroselinum sativum,* common parsley. It is usually a transparent green fluid, but is also met with as a dark oily liquid, with a peculiar odour and a pungent taste like parsley. Soluble readily in alcohol and ether.

It has decided efficacy in primary amenorrhœa or deficiency of secretion, as well as in accidental suppression and in dysmenorrhœa. A perle should be given night and morning for 4 or 5 days during the epoch.

Parsley contains no alkaloid.—L.ii./05,617; P.J.ii./05,548 C.D.ii./05,268. *c.f. Æthusa Cynapium.*

Apiol, Crystallised.

'White Apiol.' ÉTHER MÉTHYLÉNIQUE ET DIMÉTHYLIQUE DE L'ALLYL-APIONOL. CAMPHRE DE PERSIL. FR. CX.

$$CH_2:O_2:C_6H(OCH_3)_2CH_2.CH.:CH_2=222{\cdot}172.$$

In acicular crystals. For amenorrhœa a sterilised solution in olive oil containing 3 grains (**0·2 Gm.**) in 15 minims (**1 Cc.**) has been given—injected once daily for some days before the period. Also given as a quinine substitute in malaria.

$\boxed{\text{P}1}$ Capsules of Apiol and Ergotin.

Contain Apiol 5 minims (**0·3 Cc.**) and Ergotin 2 grains (**0·12 Gm.**).

$\boxed{\text{P}1}$ **Ergoapiol.** Under this name capsules are supplied for amenorrhœa, dysmenorrhœa and allied disorders.

Toxicity of Apiol is proportional to volatility of the Oil.—L. i./09,1542.

Apium graveolens. (*Umbelliferæ*) Ache des Marais.—Fr. Cx. Celery. The entire herb is used in 'Sirop des Cinq racines.'

Oil of Celery. *Dose.*—$\frac{1}{2}$ to 3 minims or more. Contains a small proportion of Apiol. Antispasmodic and nerve stimulant.

In rheumatoid arthritis 5 to 15 minim doses used successfully —action probably as intestinal antiseptic.—Pr. Nov. 10.

APOCYNUM, U.S. VIII.

American Indian Hemp Root. *Syn.* Apocynum Cannabinum. Canadian Hemp.

Average dose (of root in powder) 15 grains (**1 Gm.**).

Does not contain Alkaloid and is not in Poisons Schedule, but caution : a powerful drug.

Pharmacology.

The tincture (10%) is about $1\frac{1}{2}$ times more toxic than Tinctures of Digitalis and Squill, and nearly six times less toxic than the Tincture of Strophanthus. Produces its diuretic effect best on patients with cardiac disease and a failing heart. Ranks next to Strophanthus as regards toxicity to frog's heart and it is more toxic than digitalis and squill. No special difference in action on the kidneys, but apocynum is most likely to produce hæmaturia owing to its irritant properties.—L. i./10,81.

Uses.—Stated to be a rapid and efficient cardiac stimulant, also an active diuretic occupying a place between Digitalis and Caffeine, non-cumulative. A powerful emetic, diaphoretic, cathartic, and anthelmintic, and diuretic, employed in cardiac dropsy and Bright's disease. The active principle is said to be a crystalline non-glucosidal substance called variously **Cynotoxin** and **Apocynamarin.**

Tinctura Apocyni. 1 in 10 of Alcohol 60 %.

Dose.—5 to 60 minims (**0·3 to 4 Cc.**).

Uræmia is warded off by the profuse diuresis it produces and it is valuable in removing pleuritic effusion. **Decoctum** 1 in 60. *Dose.*— $\frac{1}{2}$ to 1 ounce.

Fluidextractum Apocyni, U.S. VIII.

Average dose.—15 minims (1 Cc.). 1=1 glycero-hydro-alcoholic. Useful in dilatation of heart, mitral, and other valvular lesions.

$\boxed{\text{P1}}$ APOMORPHINÆ HYDROCHLORIDUM.

$\boxed{\text{P1}}$ *Apomorphine and its Salts.*

$\boxed{\text{P1}}$ **Apomorphine Hydrochloride** (*Off.*) U.S., P. Helv., P. Jap. Chloretum Apomorphicum, P. Dan.

For details of the Chemical Formula of this body, see Vol. II.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**), increased, as an expectorant (not official) ; $\frac{1}{10}$ to $\frac{1}{4}$ grain (**0·006 to 0·016 Gm.**) as an *emetic per os* ; $\frac{1}{20}$ to $\frac{1}{10}$ grain (**0·003 to 0·006 Gm.**) as *emetic hypodermically.*

In all cases of poisoning it is of great value as an emetic.

A derivative of morphine or codeine obtained by heating them with an excess of hydrochloric acid in sealed tubes. Apomorphine is morphine deprived of a molecule of water. In commerce the hydrochloride occurs in minute pale greyish-white, acicular crystals.

Soluble.—1 in 60 of water, 1 in 5 of alcohol 90 %; the solution turns emerald-green in colour, but some state that this causes little loss of medicinal power. This discoloration is said to be due to the action of free ammonia in the air. For method of making colourless injection *vide infra.* Insoluble in ether and chloroform.

Incompatible with sodium carbonate and bicarbonate, tannin and iron salts.

Uses.—It acts as a non-irritant emetic and anti-stimulant; in bronchial asthma doses of $\frac{1}{6}$ grain are very useful. Small doses are expectorant and relieve bronchitis and pertussis. May be given as—

ⓅTabellæ Apomorphinæ, $\frac{1}{100}$ grain (**0·0006 Gm.**) and $\frac{1}{50}$ grain (**0·0013 Gm.**) in each, with chocolate, also **ⓅTablets Compressed.**

ⓅInjectio Apomorphinæ Hypodermica. (*Off.*).

Apomorphine Hydrochloride 1, Diluted Hydrochloric Acid 1, Distilled Water to 100. $\frac{1}{10}$ grain in 11 minims.

Dose.—5 to 10 minims (or more) as an emetic. The addition of the trace of acid keeps it stable and colourless.

This injection is hypotonic. It requires 0·055 Gm. NaCl or 0·3 Gm. Glucose added to each 10 Cc. to make it isotonic.—P.J. i./12,357.

The following will also remain colourless:—Shake Apomorphine Hydrochloride 1, with Alcohol 90% 50—add Water 140 and finally Diluted Hydrochloric Acid 10.—Pharm. Zeitung 61,640. We found this on trial very satisfactory—the solution remained colourless for weeks.

Nothing more remarkable in medicine than the effect produced by a small injection on a mad-drunk patient.—L. i./08,128. As hypnotic $\frac{1}{40}$ to $\frac{1}{20}$ grain. The patient, however wild, sleeps 10 to 12 hours and awakes refreshed.—L. ii./08,1316; B.M.J. ii./13,663.

In puerperal convulsions it soon causes vomiting and free perspiration, patient sleeps and awakes quiet.

In a case of obstruction of the œsophagus by a plumstone, the injection of Apomorphine hypodermically caused vomiting and its removal.

ⓅHypodermic Tablets are prepared containing $\frac{1}{20}$, $\frac{1}{15}$ and $\frac{1}{10}$ grain in each. Ⓟ**' Sterules ' Hypodermic** contain $\frac{1}{10}$ grain.

ⓅSyrupus Apomorphinæ (Hydrochloridi), B.P.C.

Apomorphine Hydrochloride 0·05, Diluted Hydrochloric Acid 0·25, Alcohol (90%) 4·5, Distilled Water 4·5, Syrup to 100.

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**), contains $\frac{1}{36}$ grain Apomorphine Hydrochloride in 1 drachm.

As an expectorant $\frac{1}{20}$ grain every 2 hours is useful, or, given with the same quantity of morphine every 2 or 4 hours, it lessens cough and increases fluidity of sputa.

ⓅLinctus Apomorphinæ cum Codeina.

Dose.—1 drachm (**4 Cc.**).

Apomorphine $\frac{1}{50}$ grain, Codeine Phosphate $\frac{1}{12}$ grain, Dilute Hydrocyanic Acid 2 minims, Syrup of Virginian Prune 1 drachm.

A useful expectorant.

Mistura Apomorphinæ Composita, *Luff.* (*Syn.* **Mistura Tussis,** *Luff.*)

Dose.—Half ounce every four hours.

Apomorphine Hydrochloride 1/48 grain, Morphine Hydrochloride 1/24 grain, Heroin Hydrochloride 1/24 grain, Dilute Hydrochloric Acid 5 minims, Syrup of Virginian Prune ½ drachm, Chloroform Water to ½ ounce.

A palatable mixture useful for irritable cough, especially post-influenzal cough. The hydrochloric acid effectually prevents the precipitation of any of the alkaolids.—A. P. Luff, B.M.J. i./14,635.

AQUÆ CONCENTRATÆ.

These are made commercially about 40 times as strong as the distilled Aromatic Waters by dissolving the requisite amount of Essential Oils in Spirit of 70% strength (by volume). They are diluted 1 up to 40 at the time of use and have the advantage of keeping good any length of time in any climate. The following is a list, giving the proportions of Essential Oil (or ingredient stated) to prepare 100 parts of concentrated water :—

Aqua	Amygdalæ Amaræ Concentrata U.S	4·0 (use Essential Oil *with* HCN).
,,	Anethi Concentrata	8·0
,,	Anisi Concentrata	8·0
,,	Aurantii Floris Concentrata	8·0
,,	Camphoræ Concentrata	4·0 (Camphor)
,,	Carui Concentrata	8·0
,,	Cassiæ Concentrata	8·0
,,	Chloroformi Concentrata	10·0
,,	Cinnamomi Concentrata..	8·0
,,	Foeniculi Concentrata	8·0
,,	Menthæ Piperitæ Concentrata	8·0
,,	Menthæ Viridis Concentrata	8·0
,,	Pimentæ Concentrata	5·0
,,	Rosæ Concentrata	1 to 2
,,	Sambuci Concentrata	1

These strengths have been calculated in some instances from the average yield of oils from the drugs in question, and in others from the strengths of the extemporaneous Aromatic Waters (*Off.*), allowed for use in the Colonies, qualified by the fact that the general solubility of Essential Oils in water is about 1 in 500. The solubility would not be materially greater in the weak spirit of the finished product. We have prepared all from the above formulæ and find same satisfactory. Terpeneless and Sesquiterpeneless Oils may be used as being more soluble.

ARGENTUM.

Ag=107·88.

Argentum Purum Præcipitatum.—

Manufacture.—Directions usually given for preparing this are to precipitate Silver Nitrate 1 with Hydrochloric Acid and wash by decantation. Then add Sodium Carbonate 2 in Water 6 and Glucose 2, boil and wash with boiling water. We found, however, that even on prolonged boiling the precipitate contains large quantities of Silver Chloride, hence it is better to omit the precipitation with Hydrochloric Acid.

Dissolve Silver Nitrate 1 in Water 10 and add Sodium Carbonate 2 in Water 6 and Glucose 4, in Water 4. Boil gently (or the metal will become granular and will not powder) until the black precipitate at first formed turns light grey, then wash with boiling water and dry.

Uses.—Silver emits a radiation similar to Beta rays of Radium. 30 grain doses *t.d.* of chemically pure silver in a precipitated form taken by a healthy adult produced no evil effect. The idea of the treatment consists in the belief that a reflection of soft secondary rays would result from the irradiation of a hollow viscus containing metallic silver and that provided the primary stream were directed successively at various angles to the part affected a number of these must of necessity "strike back" at any diseased area in the walls of the organ. Ulceration of cæcum, gastric ulcer, and doubtful malignant obstruction of the pylorus improved.—B.M.J. i./11,1313; ii./11,904, *vide also* Radium Chapter Vol. II.

Argenti Acetas. $CH_3COO\ Ag = 166{\cdot}914$.

In white crystals, ***soluble*** in water. A 1% solution for purulent ophthalmia in infants. Dilute Sodium Chloride Lotion may be used after it.

P1 **Argenti Cyanidum, U.S. VIII.** $AgCN = 133{\cdot}895$.

Dose.—$\frac{1}{64}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**). (U.S. gives no dose.)

White powder containing 80·48% Ag. Used for producing extemporaneously Acidum Hydrocyanicum Dilutum (U.S.) by treatment with dilute Hydrochloric Acid. Antipyretic occasionally used in epilepsy and chorea.

P1 **Pilula Argenti Cyanidi** contains $\frac{1}{60}$ grain.

Argenti Iodidum Recens. $Ag\ I = 234{\cdot}80$.

In the freshly precipitated form this salt has been used in cases of ophthalmia, especially those arising from cold. **It has useful astringent properties stated to be almost as good as adrenalin.**

Also advocated in emulsion for use in urethritis and other similar conditions. The nascent silver iodide in 3% suspension may be produced from silver nitrate 2·2 Gm., potassium iodide 2·2 Gm., distilled water 50 Cc., mucilage of Irish moss N.F. to 100 Cc. The degree of fineness of the precipitate is photographically of importance, so also by analogy therapeutically To produce a coarse precipitate the salts are separately dissolved in 5 Cc. of the water, shaken and diluted with the mucilage. For a light flocculent precipitate dissolve each in 50 Cc. of water.—Am. Jl. Ph., Feb. 06,64.

For the cure of corneal opacities and conjunctivitis, this suspension, commencing with 1% strength is most serviceable, also satisfactory in treatment of pannus. In ulcer of the cornea it should be used cautiously. For gonorrhœal ophthalmia most efficacious. One drop of weak solution instilled three times a day or oftener in cases of extensive chemosis and danger of corneal sloughing, alters the condition in a few days.—P. Maloney, Clin. Jl., Oct. 13, 15.

Gelatin 0·3% used to dissolve the Potassium Iodide.—Am. Jl. Ph., Nov. 10, 507.

Argentide. A concentrated Solution of Silver Iodide, containing 100 grains in each ounce. A small quantity added to water causes a precipitation of pure silver iodide in fine suspension for antiseptic treatment of cystitis, gonorrhœa and conjunctivitis.

Argenti Nitras. $AgNO_3 = 169{\cdot}89$. *Syn.* LUNAR CAUSTIC.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**) in a pill, best with kaolin ointment as an excipient.

Incompatible with organic material, *e.g.*, rose water, if used instead of distilled water for preparing a lotion of pigment; also with Tartaric Acid, Hydrocyanic Acid, Iodine, Potassium Iodide and Bromide.

Soluble 1 in 0·53 of water and 1 in 20 of alcohol 90%.

Dangerous Mixtures are produced under certain conditions—*e.g.*, when a small quantity of powdered Silver Nitrate, *e.g.*, 2 to 3 Gm. is mixed with an equal quantity of powdered Magnesium and then a drop of water added, a slight explosion with vivid flash occurs.—Na. Nov. 9/11,42.

Uses.—Much employed as a caustic and stimulant to promote healing. Small doses internally check diarrhœa of children. In typhoid has been used where there is hæmorrhage $\frac{1}{6}$ grain every 3, 4 or 6 hours, or even as often as every 2 hours. Rectal injections are also useful for the bleeding of dysentery (60 grains in 3 pints). In laryngeal phthisis a spray $\frac{1}{4}$ to 2 grains to the ounce.

In vomiting of pregnancy $\frac{1}{6}$ grain in a wine-glass of water every 6 hours has been found effective. In gastric ulcer $\frac{1}{3}$ grain in a pill 3 or 4 times daily half an hour before food useful. Solutions have also been used. In eczema of the flexures and particularly of mucous surfaces, Solution 2 to 3%, alternating with Lotio Calaminæ Oleosa is valuable. Pigments, 2 to 5% are used for the throat, and applied to ulcers as a stimulant. Lotions and eye-drops vary from 1 in 1,000 to 1 in 100. Purulent ophthalmia is treated with 1 to 2% drops. Ulcerative stomatitis in children is well treated by 0·5 to 2% Solution. As caustic solution (5 to 10%) to ulcer of throat which proved to be due to pneumococcic invasion.—B.M.J. i./09,1525.

Urethral and Vaginal Injections. 0·1 to 0·5% usually employed. Gonorrhœa treated by 0·005% solution of each silver and zinc nitrates, the latter salt said to increase the activity of the silver.—M. 08,136.

In lavage of the entire urethra 2 grains to the pint (1 in 5,000 approx.) is sufficiently strong. It is better to employ hydrostatic pressure, the container being about 5 feet above the couch, instead of a syringe.—B.M.J. i./12,72.

Glycerin 15% added to $\frac{1}{2}$ to 2% silver nitrate solution renders less painful, and possibly more effective.—B.M.J. ii./08,744.

Silver Nitrate is on the alert to react (*e.g.*, precipitate with soluble chloride) in such manner that its electrical state and stability of its ions are altered—herein lies its nature.—Burdon Cooper.

War wounds have been treated by spraying with very dilute Solutions—see **Wounds**, Therap. Index.

Antidote to Silver Nitrate.—Common salt, given in some demulcent drink (excess should be avoided as it is very irritant to the stomach). Salt is also used to arrest its action locally as a caustic. The pain caused by application of solutions of silver nitrate may be alleviated by previous application of a solution of cocaine nitrate.

Stains caused by Silver Nitrate are best removed by Potassium Cyanide.

Liquor Argenti Nitratis, R.O.H.—1 or 2%.

Urethral Bougies of Silver Nitrate contain $\frac{1}{2}$ grain with Theobroma basis. Give good results in obstinate cases of gonorrhœa.

Argenti Nitras Fusus. U.S. Contains 94·5% of Silver Nitrate.

Silver Nitrate 100 Gm., Hydrochloric Acid 4 Gm. Melt at low temperature and pour into suitable moulds.

Argenti Nitras Mitigatus (*Off.*). *Syn.* MITIGATED CAUSTIC. Silver Nitrate 1, Potassium Nitrate 2, fused together and moulded into sticks for use as caustic.—P. Jap. uses equal parts.

Argenti Nitras Induratus, Toughened Caustic (*Off.*). Contains 5% of potassium nitrate moulded into caustic points.

For the use of Silver Nitrate in preparation of Hair Dyes, see Vol. II.

Ophthalmic Lamels of Silver Nitrate contain $\frac{1}{500}$ grain in each combined with gelatin.

Pigmentum Argenti Nitratis Æthereum, L.H. Silver Nitrate 20 grains, Distilled Water 1 drachm, Spirit of Nitrous Ether to 1 ounce. Caustic even when painted on a greasy skin. For pruritus ani and pruritus vulvæ 3 to 10 grains to the ounce gives relief.

P1 **Pilula Argenti Nitratis et Morphinæ Acetatis, Crocq's Pill** contains $\frac{1}{6}$ grain of each salt made with Kaolin Ointment.

Argenti Oxidum. B.P. '98. Ag_2O=231·76.

Dose.—½ to 2 grains in a pill with kaolin ointment.

Is not so caustic in action as silver nitrate. Continued administration may discolour the skin. It readily yields its oxygen, and will explode (if mixed) with such bodies as phenol and creosote.

Uses.—Has been given in epilepsy, chorea, and dysentery. It stains the skin less than the nitrate.

Argenti Fluoridum. *Syn.* TACHIOL (soluble 1 in 2), ARGENTI CITRAS, *Syn.* ITROL (hardly soluble), and **Argenti Lactas,** *Syn.* ✱ ACTOL, (T.M. 192493) are occasionally used by urethral injection, strength 1 in 5,000 upwards, in gonorrhœa. Further details in Edn. XV.

✱ **Argentamin.** ETHYLENEDIAMINE-SILVER PHOSPHATE.

T.M.: 216096/1899, renewed 1912. PATENTS: 8429/1893 and 10845 of 1900 became void. Now public property.

A solution of silver phosphate (10% in ethylenediamine solution 10%).—Schmidt. Injections for gonorrhœa, 1 in 2,000—4,000 solution.

(**Ethylene Diamine.** $C_2H_4(NH_2)_2$ = 60·094.

A substitution compound of Ethylene and Ammonia. As an albumin solvent, *e.g.*, for false membrane in diphtheria.)

✱ **Argonin.** *Syn.* ARGENTI CASEINAS. Contains about 4% Silver.

T.M.: 183707/1895 renewed 1903. PATENT: 22191/1894 became void in seventh year. Now public property.

A silver nitrate-casein compound, in white powder, slightly soluble in water solutions 1 to 5% in gonorrhœa, and ½% in ophthalmic practice.

Solubility of Argonin, Airol and Protargol increased and decomposition prevented by addition of glycerin, in making aqueous solutions in the cold.—P J. i./oo,364.

Argyrol.—*Syn.* VITELLIN.

A vegetable protein compound containing about 30% of silver.

Soluble in water in all proportions—solutions keep well. ***Incompatible*** with Cocaine Hydrochloride and other alkaloids. In purulent conjunctivitis (gonorrhœal, neonatorum, etc.), free instillation of 25% solution every 3 or 4 hours; catarrhal conjunctivitis, 5 to 20% one or more times daily; trachoma, 25% solution rubbed with force on wool into lids once daily; dacryocystitis, corneal ulcers, etc., 25% solution.

Numerous critical views as to its efficacy have been published.

Ulcerative colitis has been treated by washing out with 1½ pints of 1% Argyrol solution at 80° F.

Unguentum Argyrol 2% with paraffin basis in eczematous conjunctivitis and keratitis. **R.O.H.** has 20%.

Suppositories containing 1 to 4 grains have been used.

✱Collargolum (T.M. 219555) **Colloid Silver.**—*Syn.* ARGENTUM COLLOIDALE, ARGENTUM CRÉDÉ.

Dose.—½ to 2 grains (0·03 to 0·12 Gm.) in pills or solution. **Tablets** contain ¾ grain (0·05 Gm.).

Black scales, miscible in all proportions with water, but does not form a clear solution even when dilute.

Internally has been used for gastric and intestinal catarrh; also *intravenous* injections of a ½ to 1% solution for septic affections such as endocarditis. also in difficult labours where septic complications feared. 0·1 to 0·15 Gm. in 1% solution as a dose.

Hair is stated to grow on the parts as result of subcutaneous injections of 5 to 10 Cc. of 1—2% solutions combined with 2% egg albumin solution and 1% eucain solution, in treatment of leprosy.

For ophthalmic use 1 to 10% solutions are employed.

Diphtheritic membrane is said to disappear under swabbing with 5% solution.

In urinary diseases Collargol injections for diagnosis introduced by catheter. —B.M.J ii./13,918.

Suppositories of Collargol 2½ grains also **Ⓟ Compound Collargol Suppository,** Collargol 2½, Ethyl-Morphine Hydrochloride ⅔, Extract of Indian Hemp 2 grains Glycerin and Cacao Butter *q.s.* In pelvic suppurations with pain, tenderness and general septic symptoms.

Unguentum Crédé. Collargol 15, Adeps Benzoatus 75, Cera Alba 10.

For eczema, syphilis, and gonorrhœa, and as a prophylactic to gonorrhœal ophthalmia.

Argentum Proteinicum, P.G.V. and P. HELV. (8% silver). P. BELG. P. JAP. (8 to 12% residue on ignition soluble in nitric acid). *Syn.* ✱ARGEIN (T.M. 364945); ✱PROTARGEN (T.M. 368227), (P.J. i./15,728). ✱PROTARGOL, P. AUSTR.

Dose (internally).—1 to 3 grains (0·06 to 0·2 Gm.).

TRADE MARK: 'PROTARGOL' No. 275299 (1905). PATENT 18478/1897 now ***expired.*** Three methods of making are given in the specification. (1) deals with the precipitation of Protalbumose 4·4 with Silver Nitrate 1, in 1½ of water and the subsequent heating on a water bath of the washed moist precipitate with a warm solution of Deuteroalbuminose 5, in water 4½. The precipitate dissolves and the soluble Silver Proteinate is obtained by evaporating under reduced pressure. (2) Peptone and Silver Oxide are used and in (3) Peptone and Silver Nitrate.—Per C. D., April 10/15.

Manufacture.—We have no experience of the above methods—reference should be made to the details given under Albargin which is a similar preparation.

Characters.—A protein compound, containing 8% of silver, very soluble in water. *Decomposes* with heat.

Solutions ¼ to 1% (or stronger up to 10 and 40%) for ophthalmic use, and from 4 to 20% for wounds and ulcers, are prepared by rubbing the powder into a paste with water and diluting as required with cold or lukewarm (not hot) water. Stains the conjunctiva to some extent. Ointments 5 to 10%. It is alkaline to litmus and precipitates alkaloids, *e.g.*, cocaine salts.

Gonorrhœa well treated with ½ to 10% solutions, injections to be made every half-hour and retained five to ten minutes.—M.P.C. ii./11,559.

BACTERICIDAL POWER OF THE VARIOUS SILVER PREPARATIONS.—The organic silver preparations are far less penetrating and active than silver nitrate. We gave a full résumé in E.P. XV., p. 150, 151. See also *Vol. II.*,

Prof. S. Theobald thinks that Protargol and Argyrol are responsible for many cases of conjunctival argyria, a collyrium containing half a grain of sulphate of zinc and 10 grains of boric acid is more cleanly, certain and promptly efficacious than the silver compounds.—L. ii./11,1570.

'Sterules' Ophthalmic of 10 and 25% solutions are prepared.

'Collapsubes' of Silver Protein Ointment in paraffin basis, 2% and stronger as required, with catheter attachment are prepared for urethral medication in gonorrhea.

Protargol Jelly. *Syn.* **Schindler's Jelly.**

Solve with slight heat Agar 1 in Distilled Water 200, when cold incorporate Protargol 1.

In treatment of gonorrhœa the Agar has the effect of holding the Protargol in contact with the urethral wall. It must not be used too early before the acute stage has well subsided as it may prove irritating,—nor should it remain in the urethra too long.—L. W. Harrison & C. H. H. Harold, R.A.M.C. Jl., Oct., 1912.

Vide also Manual of Venereal diseases by Sir Alfred Keogh, Brevet Col. C. H. Melville, Brevet Col. Sir William Leishman, and Major C. E. Pollock. Second Edition, 1916.

Leistikow's Bougies have a basis consisting of starch, sugar, dextrin and a little glycerin. A silver salt (*e.g.* Silver Proteinate ½ grain for each), is added and the mass is rolled into bougies. Before being used they are dipped in hot water, which makes the outside smooth and slippery. When left in the urethra they slowly dissolve.—*ex ibid.*

Neisser's Bougies. Silver Proteinate 1%, Antipyrin 2% in Cacao Butter or Glycogelatin basis. 4 inches long. For the treatment of Gonorrhoea.

Silver Gelatose. *Syn.* ✱ALBARGINE (T.M. 258119); PATENT 23,507/1900, expired 1914.

According to the patent specification Gelatose (produced by hydrolysis of glutin, etc. by acid or alkali) 10 Gm., is dissolved in water 10 Cc. and mixed after neutralising with Silver Nitrate 1·5 Gm. in water 5 Cc. The mixture is evaporated to dryness *in vacuo*. The salt thus obtained is a yellow white powder soluble to the extent of 50% in water.

Manufacture.—We conducted some experiments to produce an albumin body to comply with the requirements, viz., to contain 15% of silver and to be relatively soluble in water.

The first essential is good gelatin. Allen (Org. Chem. Anal. Vol. IV., p. 460) mentions that for the preparation of "pure" gelatin the best quality commercial gelatin should be soaked in successive quantities of cold distilled water for some days to remove salts, dissolved in boiling water and the hot solution filtered into strong (90%) alcohol. The process may be repeated if required.

The best results were secured by boiling gelatin 6 parts for about 5 minutes in 5% aqueous solution with the addition of sufficient nitric acid to render distinctly acid to litmus paper.

The solution is then cooled and neutralised with caustic soda, employing phenolphthalein as indicator, and is poured with stirring into a solution of silver nitrate 2 in distilled water—about 20 parts. To this mixture is now added three times its volume of alcohol 90% (filtering if not bright) and finally, with stirring, a sufficiency of strong sodium hydrate solution to effect complete precipitation, care being taken to avoid excess. The gelatinous body is now collected in a cloth, washed with a little alcohol, pressed dry and dried on porous tiles (preferably *in vacuo* and in the dark).

Coarsely powdered, it will dissolve in water and estimation by incineration with sodium carbonate and potassium nitrate and ultimate titration with N/10 Potassium Sulphocyanide Solution shows a content of approximately 15% of Silver.—W. H. M., June, 1917.

Analogous experiments with gelatin by hydrolysis with *alkali* were not so promising. Egg albumen was also tried without success. It may also be mentioned that any idea of evaporating solutions of the silver protein body at ordinary atmospheric pressure is out of question. Such a solution at once turns brown. The process outlined is not regarded as the last word on the matter, but it shows in general the method to be followed.

Characters and Uses.—A non-irritant compound containing 15% silver, of sand-like appearance. Soluble in water (about 1 in 2), and in alcohol 90% about 1 in 130. For gonorrhœa a 0·2% solution injected four or five times daily. 0·5 to 3% for ophthalmic use.

Incompatible with Chlorides and Tannin.

In gonorrhœa, produces no epithelial proliferation.—Pr., Apl./09,542
Solution for lavage 0·3 Gm. per litre.—Pr. Oct. '10, p. 417

Silver Gelatose Enema.

Dose.—1 pint increased to 1½ pints of strength 1 grain in 1 ounce on successive days.

Chronic Bacillary Dysentery Treatment.—Medicines *per os* cannot well reach the parts affected,—except, perhaps, large doses of Bismuth which might help to coat and protect ulcers. **Medicated Enemata** advised :—

Experiments showed that Silver Nitrate killed the Dysentery Bacillus in 5 minutes up to a dilution of 1 in 10,000, yet in the presence of a little broth (*i.e.*, albuminous substances) it failed to kill in a dilution of 1 in 100 and 1 in 500—being at once precipitated by the broth Albargin gave best results in broth, killing the Shiga Bacillus in 5 minutes up to dilutions of 1 in 500 and 1 in 1,000. Nargol came next, Argentamin had little action, while Collargol, Ichthargan and Argyrol were inert in presence of broth, as also Copper Sulphate and Cuprol (Copper Nucleinate). Cyllin was active up to 1 in 2,500 and Iodine 1 in 1,000, as also Izal.

In bacillary cases the Silver Gelatose Injection is of great value—not in amœbic cases (for these *vide* Emetine).—L. Rogers, B.M.J. ii./13,1199.

P1 ARSENIUM.

As=74·96.

P1 "*Arsenic and its Medicinal Preparations.*"*

(*Organic Arsenic Compounds are also* P1.)

P1 *Applicable to Ireland. 'Arsenic and its preparations.'*

Agricultural and Horticultural Poisons.

According to the Poisons & Pharmacy Act, 1908, *Poisonous Substances, i.e., those containing Arsenic, Tobacco, or the Alkaloids of Tobacco (i.e., Nicotine in particular), used exclusively for the above purposes for destroying insects, fungi, or bacteria, or as sheep dip or weed killers, may be sold in Great Britain and Ireland by Pharmaceutical Chemists, Chemists and Druggists, and Registered Druggists and* by persons licensed by local authorities *who conform to*

**Note.—A mixture, e.g., Hydrochloric Solution of Arsenic 1 drachm, Tincture of Ferric Chloride 3 drachms, Chloroform Water to 4 ounces.—is a Part I. poison—' Arsenic and its medicinal preparations,' and it cannot be brought into the general preparation or admixture paragraph in Part II. The Arsenic entry in the Schedule is specific—and the fact that other ingredients were added does not bring such a mixture into Part II.—A Police Court Case.—C.D. ii./* 14,5 *the Regulations of the Privy Council as to storage, transport, etc., providing the Regulations at commencement of the Schedule (q.v.), the provisions of the Pharmacy Act* 1868, *and those appertaining to the Arsenic Act in the case of Arsenical Preparations are complied with.*

P1 **Acidum Arseniosum.** $As_2O_3=197{\cdot}92$. *Syn.* ARSENIC; WHITE ARSENIC, ARSENIOUS ACID, ARSENI TRIOXIDUM U.S.

Made by roasting arsenical ores, occurs in white lumps or powder.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

Maximum single dose $\frac{1}{12}$ grain (**0·005 Gm.**); maximum daily dose $\frac{1}{4}$ grain (**0·016 Gm.**)

Soluble about 1 in 60 of water. This solution is practically neutral, at any rate is compatible with both acids and alkalis. The solubility in weak Hydrochloric Acid solution is about the same. More soluble in Alkaline hydroxide and carbonate solutions. According to our experiments it is very soluble in Glycerin at least 1 in 7—*c.f.* Antimony Oxide. Physical characters of specimens, however, vary considerably.

Incompatible with Iron Salts, Lime Water, and Magnesia.

Uses.—It is given internally immediately after meals as a general tonic and nerve tonic, as for chorea, in diabetes and anæmia, as antiperiodic for malaria, for chronic skin diseases, and in association with iron, which it appears to render more easily assimilated. Latterly its efficacy in all forms of skin affections has been doubted. Small doses of Antimony it is stated may succeed when arsenic fails—especially in lichen planus. It is said to increase respiratory power (Styrian mountaineers add it to their diet) and to improve the complexion. All preparations of arsenic should be given after food. Externally it has a caustic action, and is put into the cavities of carious teeth to kill the nerves.

Rheumatoid arthritis is treated by Arsenic, but its action is slow and it must be given for weeks or even months.

Antihæmolytic action of Arsenic. Experiments show that whether in form of Sodium Arsenite or Arsenate, Arsenic exerts on the red blood corpuscles an action antagonistic to that of certain hæmolytic agents. It is thought that on this action in part at least depends the imperfectly understood benefit resulting from administration of Arsenic in blood diseases.—B.M.J.i./11,134.

Sarcomatosis cutis.—Arsenic suggested in large, even poisonous doses, or Atoxyl.—P.R.S.M. Dermat. Sec. Dec. '10,23.

In certain types of nervous vomiting in childhood, in obstinate cases, small doses of Arsenic and Opium, just before meals, often immediately efficacious.—L. ii./11,1769.

In tuberculosis may be of use.—Arsenic interferes with carbohydrate metabolism, so that after the exhibition of small medicinal doses fat is laid on, especially in the subcutaneous regions. Arsenic also has a favourable influence on growth.—Dixon, Pr. 1913, 1.

Arsenic may possibly predispose some people to an attack of pneumonia. Cases cited of children under treatment for lymphadenoma and other diseases suddenly developing pneumonia. If this observation be confirmed F. Parkes Weber suggests that the Arsenic whilst predisposing towards pneumonia must also exert a favourable effect on the reaction of the body towards the disease. Experiments might be made by trying the effect of Arsenical preparations in regard to experimental pneumococcal pneumonia in mice and rabbits.—B.M.J. i./13,337.

For *further uses* see Liquor Arsenicalis and Liquor Arsenici Hydrochloricus.

Arsenic Eating.—20 grains of coarse powdered arsenic consumed daily in an arsenic factory. Wishing to give it up, the man promptly had severe gastric pain and diarrhœa, collapsed and died.—B.M.J. ii./09,1803

Poisoning in China from eating a large piece of native Arsenic. Recovery under lavage with diluted Condy's Fluid; but subsequently evacuations were almost all dark blood. Hæmorrhage into the intestinal canal about region of the duodenum diagnosed. Death.—L. ii./10,1138

Toleration of the system to Arsenic. Gradual increase in dose to $1\frac{1}{3}$ grain —L. i./14,236

Ⓟ Hammond's Vermin Remedy contains a great proportion of Arsenic.

Ⓟ **Arsenical Fly-papers** (*Sale of*).

Anent the trial and conviction of F. H. Seddon, in 1912, for poisoning Miss Barrow with arsenic, alleged to have been obtained from Mather's fly-papers, the following may be noted :—

Arsenical fly-papers were *expressly excluded* from Part I. of the Poisons Schedule by the entry in the 1908 Act, which is "arsenic and its medicinal preparations." Fly-papers not being medicinal are excluded from $\boxed{P1}$ of the Schedule, and are Ⓟ. As Mather's fly-papers are *not colourless* they do not come within the purview of the Arsenic Act (1851); besides, the terms of Section 6, which require the arsenic sold to be coloured with soot or indigo, are obviously inapplicable.—C.D., Mar., 23/12.

Arsenic in Carpets. Poisoning by in Germany.

Though the use of Arsenic as a carpet dye in Germany is illegal, poisoning from it is not rare. Patients complained of chronic diarrhœa, which ceased on leaving their homes, to recur on returning. The Arsenic probably reached the system by inhalation. In two women who suffered from anorexia, lassitude and tendency to diarrhœa, the blood counts are stated to have been typical of pernicious anæmia.—B.M.J. ii.,12,1570

Arsenical Poisoning from Apples in consequence of incrustations from fruit sprays, *e.g.*, Bordeaux Mixture and Paris Green.—*See* Jl. of the Board of Agriculture, October, 1913. The presence of Arsenic on the fruit, however, doubted by critics.—P.J. ii./13,603.

For Detection of Arsenic in Drugs, etc., and various Arsenic Tests, see Vol. II.

$\boxed{P1}$ **Pills and Tablets of Arsenious Acid** contain $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$ and $\frac{1}{20}$ grain.

Antidotes.

Stomach tube and emetics, olive oil, calcined magnesia in large quantity, mucilaginous drinks, stimulants and especially—

Antidotum Arsenici, Antidote to Arsenic. P. Dan. (1907). U.S. (Ferri Hydroxidum cum Magnesii Oxido.) P. Helv. and P. Jap. use Ferric Sulphate, and in other pharmacopœias.

Ferric Chloride 3 (or Strong Solution of Ferric Chloride B.P. '98,3), Water 17. When required for use, add this solution to Calcined Magnesia 1, previously mixed with Water 19, and shake well! Should be freshly prepared, and given in doses of a tablespoonful every 5 or 10 minutes, until the symptoms are relieved. Ferric Hydrate should be administered in at least 12 times the quantity of the Arsenic supposed to have been swallowed. The Antidote contains about $2\frac{1}{2}$% of the hydrate.

The diluted Ferric Solution and the mixture of Magnesium Oxide should be kept ready in separate bottles for immediate use.

Or give Liquor Ferri Dialysatus.

P1 **Liquor Arsenicalis, Fowler's Solution** (*Off.*). Fr. Cx. P.G.V P. Jap. *Syn.* Liquor Potassii Arsenitis, U.S.

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). Contains 1% of arsenious anhydride.—F.I.

Fr. Cx.—*Max. dose* during 24 hours, 25 minims approx.

Incompatible with Liquor Strychninæ Hydrochloridi. Employ Liquor Arsenici Hydrochloricus. Poisoning has occurred.—L. ii./07,1173.

Exophthalmic goitre.—Arsenic is a routine treatment, 5 minim doses of Liquor Arsenicalis thrice daily except during one week in each month, or during the menstrual period, for 6, 8 or even 12 months. May be combined with Bromide, *e.g.*, 3 minims with 10 grains *t.d.* Tincture of Convallaria is recommended if pulse rate be over 110.

In pernicious anæmia a sheet anchor, starting with 4 minims and rising to 12 or 15 minims if possible. Slow gradual reduction of the dose also essential. —B.M.J. i./09,1349.

In chorea has been given in large doses with good result. There is no specific for the disease. If not tolerated Zinc Sulphate may be useful in 2 to 3 grain doses gradually increased.—B.M.J. ii./08,699.

In diabetes of great value, after sugar reduced by dieting and Codeine. Should be given for at least 3 months, restrictions in diet being gradually removed. Also in asthma, especially in children and old emphysematous people.

Phagocytosis is greatly diminished by arsenic in strong proportion and considerably increased when in diluted solution—being doubled when working in a solution of 1 in 200,000.—L. ii./08,1297.

Case of probable pemphigus vegetans, treatment Liquor Arsenicalis 3 minims *ter die p.c.* increased to 9 minims, with Iron and Strychnine. Locally Boric Acid fomentations, Orthoform dusted on and Ointment of Creolin, Lead, Zinc and Mercury.—P.R.S.M. Dermat. Sect., Jan. 1910, p. 23.

In Hodgkin's disease, arsenic should be pushed to the farthest limit short of toxic effects.—Whitla, Pract. Med. pp. 647, 1241. See also L. ii./08,362, and B.M.J., i./09,1302.

In nervous manifestations in children. Arsenic most effective.—M.P.C. ii./11,654.

Asthma treated by 5 minim doses with breakfast and dinner in conjunction with an alkaline Stramonium mixture.—P.J. ii./10,694.

Anæmic vomiting. 2 minims of Fowler's Solution thrice daily found of great value—to this may be added at once or in the course of a few days 10 grains of Citrate of Iron and Ammonia. Bismuth and Alkalis of little value. —A. P Beddard, Pr. March, 1912,359.

Herpes zoster relieved by Arsenic—15 drops of Fowler's solution daily being taken for some time.—H. Carlill, B.M.J. ii./17,9.

P1 **Liquor Arsenici Hydrochloricus** (*Off.*). U.S.

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). Contains 1% of arsenious anhydride. Is compatible with acid mixtures.

In making this by the B.P. directions use the entire litre of water with the Hydrochloric Acid instead of half that quantity. Solution is more easily effected.—P.J. ii./09,315. *c.f.* also *ibid.* ii./08,291.

P1 **Tablets of Arsenious Acid and Mercuric Chloride** 1/64 grain (**0·001 Gm.**) of each.

In exophthalmic goitre have been given one thrice daily.

P1 **Mistura Arsenii Quininæ et Ferri**—*Syn.* Bacelli's Mixture (slightly modified).

Dose.—$\frac{1}{2}$ to 1 ounce (**15 to 30 Cc.**).

Dissolve Quinine Sulphate 3 in Water 150 with aid of a little Dilute Sulphuric Acid. Then dissolve Green Ammonio-Citrate of Iron 5 in Water 150, mix and add Fowler's Solution 3. Employed in malaria.

P1 **Arsenii Bromidum.** $AsBr_3 = 314{\cdot}72$.
Dose.—$\frac{1}{60}$ to $\frac{1}{12}$ (**0·001 to 0·005 Gm.**).

In yellowish white deliquescent crystals, soluble in water. Is recommended for diabetes and epilepsy.

P1 **Liquor Arsenici Bromatus.** *Syn.* LIQUOR POTASSII ARSENATIS ET BROMIDI. CLEMENS' SOLUTION.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), once or twice a day.

Potassium Carbonate 1, Arsenious Anhydride in powder 1, Distilled Water 80. Boil until dissolved. When cooled, add Bromine (by weight) 2, and Distilled Water, *q.s.* to 100. Heat until decolourised. The solution is useful in epilepsy and diabetes with careful diet.

Contains approximately 1·5% Arsenic Acid, 0·5 to 0·6% Hydrobromic Acid, and 1·6 to 1·7% Potassium Bromide. Details in last Edn. p. 155.

P1 **Pills (Pilula Arsenicalis) and Tablets of Arsenious Acid** contain $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$, and $\frac{1}{20}$ grain.

P1 **Granula Dioscoridis.** (P. Dan. and FR. Cx.).
Contains 1 milligramme Arsenious Anhydride. *Dose.*—1 to 5.

P1 **Pilula Arsenicalis et Strychninæ** contains $\frac{1}{50}$ grain (**0·0013 Gm.**) of each.

P1 **Pilula Asiatica.** *Dose.*—1 or 2 daily.

Arsenious Anhydride, $\frac{1}{12}$ grain (**0·005 Gm.**), Black Pepper $\frac{3}{4}$ grain (**0·05 Gm.**), Gum Acacia *q.s.* In chronic skin affections.

In psoriasis convenient method of giving arsenic.—L. i./09,967.

P1 **Pilula Ferri Arsenicalis.** *Dose.*—1 thrice daily.

Arsenious Anhydride, in fine powder $\frac{1}{60}$, Exsiccated Ferrous Sulphate 3, Syrup $\frac{1}{2}$; in grains, for one pill; in grammes, for fifteen.

In chlorosis and anæmia most efficacious.

P1 **Pilula Ferri Arsenicalis cum Strychnina** is the same with Strychnine Hydrochloride $\frac{1}{60}$ grain.

P1 **Pilula Acidi Arseniosi et Ferri Redacti.**—MONCKTON.

Dose.—1 to 3 grains. Arsenious Anhydride, 12 grains. Reduced Iron 1 ounce. Excipient *q.s.* Mix.

P1 **Tablets,** of Arsenious Acid $\frac{1}{64}$ grain and Blaud's Pill 4 grains.
Dose.—1 to 4.

P1 **Tablets of Arsenic, Iron and Quinine** contain Arsenious Acid $\frac{1}{60}$ grain, Ferric Hypophosphite 2 grains, Quinine Acid Sulphate 1 grain.

P1 **Pasta Arsenicalis.** **Martindale.** For dental caries to destroy the nerve.

Arsenious Anhydride, levigated, 30, Plaster of Paris 40, Morphine Sulphate 20, Cocaine 5. Mix and add Clove Oil 5, Phenol 25. **R.D.H.** has Arsenious Acid 2, Morphine Acetate 1, Creosote *q.s.* to form a paste. *These two preparations are very poisonous.*

The equivalent of about $\frac{1}{16}$ grain of Arsenious Acid is sufficient.

Apply as follows:—Remove as much carious tissue as possible, exclude moisture and disinfect. Apply the paste as near pulp as possible and protect by concave cap. Seal cavity carefully with Mastiche in Chloroform.

P1 **Baldock s Paste** is also used by many dentists.

Desirability of giving up the use of Arsenic in dentistry.—Sir Malcolm Morris.—B.M.J. ii./09.547.

P1 **Dental Arsenical Fibre.** *Syn.* **Arsenious Wool. Gossypium Arseniosum, R.D.H.** Arsenious Acid 5, Tannin 2, Morphine Acetate 10, Carbolic Acid liquefied *q.s.* to make a mass.

Mix with a sufficiency of finely cut cotton wool and allow to dry. Used in the same way as Pasta Arsenicalis. Some formulæ contain creosote *vice* carbolic acid.

P1 **Arsenii Iodidum.** (*Off.*). **U.S.** AsI_3=455·72.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain (**0·003 to 0·012 Gm.**), in a pill.

Soluble, forming a slightly cloudy acid solution in water 1 in 11, in alcohol 90% 1 in 40.

The two elements combine forming orange-coloured crystals. It should be recrystallised so as to exclude a melted mixture of Arsenium and Iodine, or Arsenium powdered 10, may be mixed with Iodine 51 in presence of water, digested at gentle heat and evaporated to dryness.

Solution 1% in 1 to 10 drop doses in milk, useful for lymphatic and scrofulous children, has marked iodine effect. Also used externally.

In diseases of the alimentary canal especially gastritis, in phthisis and in all cases of neuritis of great use. In epilepsy by gradually adding arsenic to the bromide mixture, the dose of the bromide may be lessened and will finally keep the fits under alone. Useful also in helping to clear up a pneumonic lung and in promoting absorption of pleuritic effusion.—L. i./11,1210.

The content of AsI_3 may be estimated by titrating a weighed quantity in an aqueous Sodium Bicarbonate Solution with decinormal Iodine Solution.

P1 **Injectio Arsenii Iodidi Hypodermica.**

Dose.—$\frac{1}{100}$ grain (**0·0006 Gm.**) in 6 minims (**0·4 Cc.**) of sterile water. The strength may be increased if desired.

P1 **Sterules, Hypodermic,** contain 1/100 grain.

P1 **Liquor Arsenii et Hydrargyri Iodidi** (*Off.*). P. Jap. *Syn.* DONOVAN'S SOLUTION.

Contains Arsenious Iodide and Mercuric Iodide, of each 1%, or 87½ grains of each in Distilled Water *q.s.* to 20 ounces. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**). (U.S. has smaller average, 1½ minims.)

Given for syphilitic skin diseases.

Incompatible with potassium iodide and Sal Volatile (*c.f* Nessler's reagent); also with alkaloids and acids.

See also P1 **Pilula Arsenii et Hydrargyri Iodidi.**

P1 **Mistura Arsenii et Hydrargyri Iodidicum Phenazono.** *Syn.* ✱HYDRARSAN.*

Dose.—½ ounce thrice daily after food.

Donovan's solution 2 drachms, Potassium Iodide 1 drachm, Phenazone 1 drachm, Water to 6 ounces.

Method of Preparation. We find the following best:—

Powder the Antipyrin and the Potassium Iodide very finely, add a small quantity of water, then the Donovan's Solution in a mortar with very thorough stirring. By so doing solution is effected. Then gradually add the water with continuous stirring and shaking. In this way precipitation is almost entirely avoided and the mixture is produced slightly opalescent.

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* *Note.*—This name was suggested by J. C. McWalter, but it is also registered as a T. M., No. 350130.

Suggested for arsenical treatment of syphilis. The effect seems more potent than that of simple Donovan's treatment. Although immediate improvement follows, the effect does not appear to be very permanent.—M.P.C. i./11,11. See also B.M.J. i./11,1429.

P1 **Potassii Arsenis.**—*Dose.*—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm**).

The dry salt $KAsO_2+HAsO_2+H_2O=272{\cdot}044$ containing about 73% As_2O_3 made from arsenious acid and potassium bicarbonate.

Used occasionally in place of arsenious anhydride.

P1 **Cupri Arsenis.** $Cu_3As_2O_6=436{\cdot}63$. **Scheele's Green.**
Dose.—1/100 to 1/25 grain (**0·0006 to 0·0025 Gm.**).

Amorphous green powder, used in various intestinal affections, cholera morbus, cholera infantum, diarrhœa, dysentery and typhoid. Dose for adults $\frac{1}{5000}$ to $\frac{1}{3000}$ grains every 10 minutes for an hour, then hourly; for children, half this quantity. Small repeated doses essential. For chlorosis and functional anæmia, $\frac{1}{30}$ to $\frac{1}{25}$ grain thrice daily are given.

P1 **Acidum Arsenicum.**—*Syn.* **Ortho-Arsenic Acid.**
$H_3AsO_4.\frac{1}{2}H_2O=150{\cdot}992$.

Dose.—$\frac{1}{64}$ to $\frac{1}{12}$ grain (**0·001 to 0·005 Gm.**). A crystalline powder soluble about 2 in 1 of water, and very in Alcohol 90%. Arsenites are said to be twice as active as arsenates. The following salts are in use:—

P1 **Ferri Arsenas** (B.P. '98). *Dose.*—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**) in a pill.

(For *Hypodermic Injection* see **Injectio Sodii Arsenitis et Ferri.**)

This is an amorphous greenish powder and consists of Ferrous Arsenate, $Fe_3(AsO_4)_2,6H_4O=553{\cdot}536$ (not less than 10%) with Ferric Arsenate $Fe_2(AsO_2)_2=389{\cdot}60$, and Iron Oxide. The Ferrous Arsenate rapidly oxidises in the air. In chronic skin affections of all kinds. TABLETS contain $\frac{1}{8}$ grain (**0·008 Gm.**).

Useful in night sweats.—L. ii./94,1023.

The FR. CX. preparation (method given) has formula $(AsO_4)_2Fe_3+3H_2O$—Ferrous Arsenate—with a little Ferric salt. To be kept in bottles sealed down with fat. *Maximum single dose* $\frac{3}{4}$ grain; maximum during 24 hours $2\frac{1}{4}$ grains approximately.

P1 **Sodii Arsenas Anhydrosus** (*Off.*) (**Exsiccatus,** *U.S.*) $Na_2HAsO_4=185{\cdot}968$.

Dose.—$\frac{1}{40}$ to $\frac{1}{10}$ grain (**0·0015 to 0·006 Gm.**).

Sodium Arsenate crystallises with either 7 [$Na_2HAsO_4,7H_2O=312{\cdot}080$], **U.S., Fr. Cx., Ph. Ned., P. Belg.,** or 12 molecules [M.W. = 402·16] of water. The anhydrous salt, in white powder, dried at 150° C., contains 61·8% of As_2O_5, and is soluble 1 in 3 of water at 25° C. 1 of the anhydrous salt equals 1·68 of the salt with $7H_2O$.

F.I. requires the salt crystallised with $7H_2O$ and containing 36·85% of arsenic acid as adopted by many Pharmacopœias.

Soluble 1 in 5 of water (B.P. 1 in 6). Slightly soluble in alcohol.

FR. CX. (*vide* above) has *max. single dose* $\frac{1}{8}$ grain. *Max. during 24 hours,* $\frac{1}{3}$ grain approximately.

In trypanosomiasis.—B.M.J. i./05,1140, ii./07,834.

P1 **Pilula Sodii Arsenatis**, $\frac{1}{32}$ and $\frac{1}{64}$ grain.

P1 **Injectio Sodii Arsenitis et Ferri.**

This ‘ARSENIC AND IRON INJECTION’ has been largely employed in anæmic conditions in two strengths,—

“*No.* 1 *grade* (*weak*).” Hypodermic dose 1 Cc. = 0·025 Gm. “Soluble Iron Arsenite,” equivalent to $\frac{1}{2}$ milligram of Arsenious Acid, and the other

“*No.* 2 *grade*” (double strength) 1 Cc. = 1 mgr. of Arsenious Acid.

Injections may be made (as deeply as possible) with advantage at 1 to 2 days interval, and commencing for the first few doses with $\frac{1}{4}$ to $\frac{1}{2}$ Cc. only of the No. 1 when the stomach is empty. Intramuscular (gluteal) Injections may be better tolerated. The course of the treatment extends over 1 to 2 months.

P1 ‘**Sterules**’ of “**Arsenic and Iron**” are prepared of each of the above. *Dose.*—15 minims (1 Cc.) hypodermically.

Physicians should carefully specify which strength is required.

P1 **Guttæ Sodii Arsenitis et Ferri.**—“IRON AND ARSENIC DROPS.” *Dose.*—5 drops (or minims) containing $\frac{3}{4}$ grain (**0·05 Gm.**) of “Soluble Iron Arsenite” equivalent to $\frac{1}{64}$ grain (**0·001 Gm.**) of Arsenious Acid—(*c.f. antea*) *per os.*

A gradual increased dose up to 20 drops is recommended during treatment.

Postural albuminuria in a boy of 12 healed by arsenic and iron and application of massage, and electricity to the legs greatly improved the condition.—L. i./10,19.

P1 **Injectio Sodii Arsenatis et Strychninæ.**

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**) hypodermically. Sodium Arsenate 2 ($\frac{1}{30}$ grain in 10 minims), Strychnine Hydrochloride 1 ($\frac{1}{60}$ grain in 10 minims), Water to 600.

P1 **Sterules, Hypodermic,** contain 10 minims of above.

P1 **Injectio Sodii Arsenatis et Strychninæ et Quininæ** contains 1 grain Quinine Acid Hydrochloride added to 10 minims of the above.

P1 **Sterules, Hypodermic,** contain 10 minims.

P1 **Liquor Sodii Arsenatis** (*Off.*), **U.S.**

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). 1% of Exsiccated Salt.

P1 **Pearson's Solution of Arsenic** used on the Continent, is 1 of crystallised Sodium Arsenate ($7H_2O$) in Water 600.

P1 **Arsenical Cigarettes** are made of paper impregnated with sodium arsenate, so that each contains $\frac{3}{4}$ grain (**0·05 Gm.**) of the salt. The patient ought to inspire the fumes deeply three or four times.

P1 **Mercury Salicyl-Arsenate.** *Syn.* ENESOL.

White powder containing 38% mercury. ***Soluble*** in water 1 in 25. Solution said to be painless on injection.—B.M.J. ii./04,1324.

P1 **Sterules, Hypodermic,** are prepared 1 grain in 30 minims.

Unguentum Arsenii Anserinatum—contains 5% (more or less required) of finely powdered Arsenium in Anserine basis (Prepared Goose Grease—*q.v.*).

Uses.—We suggest this for use in skin affections. It is possible that the therapeutic effect of Arsenic may be introduced by this readily absorbed basis—the preparation is certainly worthy of trial. Simultaneous examinations of the urine for Arsenic would prove absorption or otherwise.

P1 ORGANIC ARSENIC COMPOUNDS.

We confine ourselves in this chapter to salient features. For the pioneer work on Chemo-therapy readers are referred to the XVth and XVIth Edition of the book.

In reviewing the Organic Arsenic bodies we deal first with those derived from the aliphatic or fatty series and pass then to the Aromatic or Benzol Ring Compounds.

To commence with we would give a word of warning as *to the danger of 'pushing' the dose of any of the Organic Arsenic Compounds.* Signs of disturbance of vision during treatment should be looked for. Poisonous and untoward effects are dealt with under the individual chemical compounds.

An Organic Arsenic compound as distinct from the Inorganic form has the Arsenic in direct chemical combination with a carbon atom. This appears to greatly lessen its toxic properties. Furthermore, Arsenium is capable of acting either as a trivalent or pentavalent element, and it has been found that Organic Compounds containing the element in its trivalent form are more potent in action upon protozoa.

In the descriptions of the organic arsenic compounds the following terms are used :—

Arsinic Acid constitutes a dialkyl or dialphyl derivative of arsenic acid—*i.e.*, cacodylic acid—and its homologues, *e.g.*, phenyl-arsinic acid, $(C_6H_5)_2AsO.OH$.

Arsonic Acid indicates arsenic acid, $AsO.(OH)_3$, in which one of the hydroxyls is replaced by an organic radicle. An *arsonate* is a salt of this acid. French and German chemists do not as a rule make these distinctions.

Arylarsonate.—This term indicates an aromatic arsonate. Aryl indicates *e.g.*, phenyl, tolyl, xylyl, or naphthyl as applied to substituted hydroxyl in arsenic acid.

Arsenoic.—In French literature refers to aromatic arsenic bodies containing two atoms of arsenic believed to be coupled together by a double linkage—*e.g.* $C_6H_5-As=As-C_6H_5$, arsenobenzene, comparable with $C_6H_5-N=N-C_6H_5$, azobenzene.

(I). *Aliphatic Series.*

P1 Acidum Cacodylicum. Dimethylarsinic Acid.

$(CH_3)_2AsO.OH=138{\cdot}026.$

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**).

The ultimate product of oxidation of Arsenium-dimethyl (Cacodyle), *Syn.*—Tetramethyl Diarsine $(CH_3)_2As—As(CH_3)_2$, and of Cacodyle Oxide, *Syn.* Alkarsin, $(CH_3)_4As_2O=226{\cdot}036$. Colourless crystals neutral to Methyl Orange. ***Soluble*** about 2 in 1 of water and 1 in 4 of alcohol 90%, and although containing 54·3% arsenium, equivalent to 71·6% arsenious acid, it is relatively non-toxic—similarly with the Salts. It will be noted that this acid has only 1 OH group, hence it is not so toxic as its parent arsenic acid, with 3 OH.

KAKODYLE was discovered by Bunsen, in 1842.

Sodium Cacodylate and Arrhenal, according to Fortescue Brickdale (B.M.J. ii./10,1598), are probably broken down in the body to such slight extent that large doses may be given without producing any therapeutic, much less toxic, effect. They appear, principally in the urine, unaltered. A small proportion is, however, oxidised and from this arsenic Ions are set free, exerting a mild action during a prolonged treatment.—P.J. ii./11,16.

P1 **Calcii Cacodylas** $[(CH_3)_2AsO_2]_2Ca = 314{\cdot}096$.

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) *per os* or intramuscularly.

A white amorphous powder. ***Soluble*** 2 in 1 of water, 1 in 2 of alcohol. In tuberculosis daily injections of $\frac{1}{2}$ grain with a glycerin Solution of Calcium Iodide 10 grains and Ferrous Iodide $1\frac{1}{2}$ grains per drachm internally satisfactory.—N.Y Med. Jl., March 24/13, per Pres.

P1 **Ferri Cacodylas.** $[(CH_3)_2AsO_2]_3Fe = 466{\cdot}894$.

Dose.—$\frac{3}{4}$ to 5 grains (**0·05 to 0·3 Gm.**) *per os* per diem, or $\frac{1}{2}$ to $1\frac{1}{2}$ grains (**0·03 to 0·1 Gm.**) hypodermically per diem.

Manufacture.—Precipitate the Ferric Hydroxide from a sufficiency of Ferric Chloride solution containing 1 molecular proportion of Ferric Chloride (Fe_2Cl_6+Aq.). Wash the precipitate and combine with Cacodylic Acid 6 molecular proportions, or precipitate Barium Cacodylate with Ferric Sulphate solution in molecular proportions.

Yellowish powder soluble 1 in 15 of water used for anæmia and chlorosis, also in glandular swellings, *e.g.*, in syphilis, hypodermically.

P1 **Guaiacol Cacodylas.** $(CH_3)_2.AsO.O.C_6H_4(OCH_3).H_2O = 262{\cdot}125$.
Syn. CACODYLIACOL.

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) *per os* or hypodermically in sterile oil in affected regions for tuberculosis. Soluble 1 in 25 water, 1 in 1·5 alcohol 90%.

P1 **Magnesii Cacodylas.** $[(CH_3)_2AsO_2]_2\ Mg, ?H_2O$.

Dose.—$\frac{3}{4}$ grain (**0·05 Gm.**) hypodermically, gradually increased (5% solution suitable). White amorphous powder soluble 1 in 3 of water.

Uses, etc., as the Sodium Salt, *q.v.*

P1 **Sodii Cacodylas.** **P. Helv.** FR. CX. (*N.B. Anhydrous*). **Sodium Dimethylarsinate.** $(CH_3)_2AsO_2Na + 3H_2O = 214{\cdot}066$.

Dose.—Average per rectum and hypodermically $\frac{1}{2}$ to 1 grain (**0·03 to 0·06 Gm.**).

FR. CX. (*vide* above) has *max. single dose* 3 grains and during 24 hours 3 grains approximately.

The salt of the above formula contains 35% Arsenium whilst the anhydrous salt contains 46·8%, equivalent to 61·8% arsenious acid. In commerce usually contains 18 to 25% of water. It should be carefully examined for inorganic arsenic, and, being a deliquescent salt, solutions should be standardised.

Soluble 2 in 1 water, in alcohol 1 in 1.

Uses.—In tuberculosis generally (curative results come very slowly), in diabetes mellitus, exophthalmic goître, pernicious anæmia, cancer (particularly of the stomach), malaria, chorea, leprosy, psoriasis, and other chronic skin affections, and in all cases in which arsenic has been used, but when given by the mouth or per rectum may cause renal congestion with albuminuria and fall in the quantity of urine excreted.

As far back as 1862 Cacodylic acid was found to give excellent results in treatment of chronic skin diseases and in pulmonary tuberculosis. It was stated in 1865 (before Koch's discovery of the bacillus) to "impart to the blood of the patient a condition inimical to the tuberculosis." Murphy, in Chicago in 1910 obtained valuable results with Sodium Cacodylate in syphilis, has also used it to allay the pain of metastatic osseous carcinomata and for the various other purposes for which arsenic is indicated. Usual dose in syphilis treated by him has been 1 to 2 grains *intramuscularly,* with disappearance of the spirochetes from the primary chancre in 48 hours, the chancre becoming clean and soft in 72 hours. It seems to destroy the spirochetes. It possesses advantages over Arsenobenzol.—L. ii./10,1858.

Chancre of the lower lip treated by 1 grain doses of Sodium Cacodylate hypodermically into the pectoral muscles every 24 hours. This was done for 8 days. Then double dose for 4 days more. The chancre became more circumscribed. Then 3 grains daily for 7 days were given with marvellous result. Scab cleared away and there was ultimate recovery under 1 grain daily doses subcutaneously.—P.J. i./11,36.

In syphilis thought to be of little value. May have slight action on papular and nodular syphilides but not to be compared with Mercury and Potassium Iodide.—Jl. Am. Med. Assn. 1916, 67, 2012, P.J. i./17, 109.

Intravenously in sufficient quantity Sodium Cacodylate is better than Salvarsan. Dose never less than 10 grains and often as much as 30 grains repeating the dose in 4 days' time. No toxic symptoms.—W. H. Forster, Jl. Amer. Pharm. Assn., 1917, 6, 142 (P.J. i./17, 275.)

P1 **Elixir Sodii Cacodylatis** (Standardised).

Dose.—30 minims (equivalent to ½ grain of the salt).

This forms a palatable method of administering the salt.

P1 **Pills** contain ½ grain (**0·03 Gm.**).

The following formula in grains is useful:—

Sodium Cacodylate 50, Benzoin 50, Liquorice Powder 50, Acacia Powder 25, Alcohol 90% *q.s.* Divide into 100 pills. *Dose.*—1, three or four times a day.

P1 **Hypodermic and Intravenous Injection.** A sterile preparation is made and standardised to contain 0·05 Gm. (¾ grain) of Cacodylic Acid in 1 Cc. (15 minims approx.), a dose once in 24 hours. To avoid pain, solutions should be fairly diluted. The same dose diluted with 4 drachms of water is used for **Rectal Injection.**

In psoriasis subcutaneously, but administration of Arsenic *per os* preferred.—L. i./09,967.

P1 **Sterules Hypodermic,** contain the above average dose.

P1 **Injectio Cacodylatum Compositum.** *Dose.*—(average) 15 minims (**1 Cc.**) containing Sodium Cacodylate ¾ grain, Iron Cacodylate ½ grain, Strychnine Cacodylate, $\frac{1}{64}$ grain. It should, we find, be rendered slightly acid with Cacodylic Acid at the finish.

Gautier recommends: Cacodylic Acid 5 Gm., Sodium Carbonate *q.s.*, Cocaine Hydrochloride 0·08 Gm., Creosote 6 drops, dissolved in Alcohol 8 Gm. with Sterile Water *q.s.* to 100 Cc., *i.e.*, 15 minims (**1 Cc.**) contain ¾ grain, (**0·05 Gm.**) of Cacodylic Acid for a dose—hypodermically—which is not to exceed 0·1 Gm. (1½ grains) *pro die*, the average being 0·02 to 0·05 Gm. every 24 hours.—F. N. 1908,46.

$\boxed{\text{P1}}$ **Solutio de Cacodylato de Sodio Iodo-mercurico Esterilisado.** Sodium Cacodylate 4, Mercuric Iodide 0·5, Sodium Iodide 0·5, Water to 100.

Dose.—Each Cc. contains 0·04 Gm. of sodium cacodylate and 0·005 Gm. of mercuric iodide.—C.D. ii./09,194.

$\boxed{\text{P1}}$ **Strychninæ Cacodylas.** $C_{21}H_{22}N_2O_2(CH_3)_2AsO.OH = 472{\cdot}327$, *Dose.*—$\frac{1}{30}$ to $\frac{1}{10}$ grain (**0·002 to 0·006 Gm.**).

White crystalline powder hardly soluble in water. Should prove a useful salt.

$\boxed{\text{P1}}$ **Di-sodium Methylarsenate.** *Syn.* SODIUM METHYL ARSONATE, ARRHENAL "New Cacodyle" $Na_2AsCH_3O_3,5H_2O = 274{\cdot}069$. FR. CX.

Dose.—⅖ to 3 grains (**0·025 to 0·2 Gm.**) *per os* or hypodermically. FR. CX.—*Max. single* and during 24 hours *dose* 3 grains.

Prepared by the interaction of Methyl Iodide and Sodium Arsenate in presence of excess of Alkali.

Soluble about 1 in 1 of water, only slightly in alcohol 90%.

Arsenic-content. (With 5 mols. H_2O)=27·35%.

Uses.—Similar to Sodium Cacodylate *q.v.*

It is stated not to produce Cacodyle Oxide when given by the mouth.

$\boxed{\text{P1}}$ **Sterules, Hypodermic,** ⅓ grain (**0·02 Gm.**), and ¾ grain (**0·05 Gm.**).

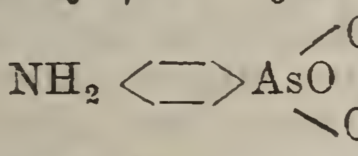
Tests to distinguish organic arsenic bodies.—*Vide Vol. II. of this Edition, q.v.* also for a number of *other Organic Arsenic Compounds* of the *Aliphatic* Series which, not having been tried in medicine, are of theoretical interest.

(II.) *Aromatic Series.*

$\boxed{\text{P1}}$ ***p*-Aminophenylarsonic Acid.** *Syn.* **Arsanilic acid, Aniline-arsenic acid.** $NH_2C_6H_4.AsO(OH)_2=217{\cdot}064$.

Arsanilic Acid is weakly basic. Its Hydrochloride is immediately hydrolised by water. It is soluble, however, in methyl and ethyl alcohol. It has been employed as

$\boxed{\text{P1}}$ **Sodii *p*-Aminophenylarsonas.** *Syn.* ✱ARSAMIN, (T.M. 302016) ✱ATOXYL (T.M. 244636), ✱SOAMIN (T.M. 302133), SODIUM ARSANILATE. $C_6H_7N.AsO_3Na$ or



= 239·056.

Usually in commerce + $4H_2O$ = 311·12. The more hydrated forms lose water by efflorescence and commercial specimens give water content ranging from 3 to 5 H_2O.—G. T. Morgan.

Dose.—$\frac{3}{4}$ to 3 grains (**0·05 to 0·2 Gm.**). This dosage *per os* for syphilis has been advised daily for a week, then to be intermitted, but caution is recommended. Max. single dose is stated to be 3 grains (**0·2 Gm.**)

Intramuscular injections (into the buttock) have been given of much larger doses, even up to 10 grains, dissolved in water at a time in a total course of 100 grains, at several days' interval in treatment of syphilis as a substitute for Mercurials. The upper third of the buttock is the usual site of injection.—B.M.J. ii./08,393.—*N.B. Not without danger.*—Avoid heroic doses. 3 grains in 10% solution for a dose safer.

Solutions should be freshly prepared with cold boiled water and may be slightly warmed at time of injection. If kept, likely to decompose.

Manufacture.—It was originally prepared by Béchamp *vide* Comptes Rend., 1863, Vol. 56, I., p. 1172, though the substance he obtained he thought to be Arsenic Anilide. By heating Arsenic Acid with an excess of Aniline the Arsenate is formed, this however is transformed by prolonged heating at 190°C. into *p*-Aminophenylarsonic Acid. This attained, one neutralises with Sodium Carbonate, decomposes with Nitric Acid, collects the Acid, neutralises with Sodium Hydroxide, and evaporates to crystallise. Recrystallise from 90% Alcohol.

History of Organic Arsenic Compounds in treatment of protozoan diseases. This paper clears up the chemistry and origin of Atoxyl, giving credit to Béchamp and to H. W. Thomas (showing that it had value as a trypanocide). Atoxyl was exploited by the Germans, the process of making being concealed, and it was erroneously described by the firm in question as a compound of arsenious acid following on Béchamp's error. Fourneau showed that Atoxyl was the substance discovered by Béchamp.—Benjamin Moore, B.M.J.i./16,617.

A white crystalline powder with slightly saline taste.

Arsenic Content.—Theoretically on $4H_2O=24·09\%$.

Soluble about 1 in 6 of water (some samples may dissolve in a little less). Also soluble about 1 in 125 of alcohol 90% and more so in Methyl Alcohol. The Anhydrous substance is readily soluble in Methyl Alcohol but practically insoluble in Ether, Acetone, Benzol, or Chloroform.

Incompatible with Mercurials (*e.g.*, Perchloride.—L.i./08,113, *c.f.* Hydrargyri Arsanilas) and other heavy metals in solution, also with Acids.

Flavoring.—The compound is practically tasteless, but any desired Glyl or Syl may be used if required.

Uses.—Large quantities of arsenic can be given by it in skin diseases (psoriasis, lichen), in anæmia, syphilis, sarcoma, elephantiasis, malaria, tuberculosis and trypanosomiasis. Syphilis has been treated with 50% Ointment used on chancre of the skin.

It is stated to have less than 1/40 the toxicity of Arsenious Acid.

$\boxed{\text{P1}}$ **Pills of Arsamin** contain $\frac{1}{2}$ grain and upwards. $\boxed{\text{P1}}$ **Elixir Arsamin** contains $\frac{1}{2}$ grain in each drachm and may be prepared stronger if required. $\boxed{\text{P1}}$ **Sterules (Hypodermic) of Arsamin** $\frac{1}{2}$ also $\frac{3}{4}$ grain in 15 minims (**1 Cc.**) of water, and larger up to 15 grains in each.

Purves Stewart has prescribed the Elixir considerably in cases of disseminated sclerosis and tabes without having witnessed bad effects from the drug, but cases must be watched carefully.

C. Wray suggested that Atoxyl should be first heated with a little alcohol, in which it is only slightly soluble, to sterilise it prior to dissolving it in boiled water for injection.—B.M.J. ii./08,862.

P1 **Arsamin Paste.** 10% may from our experiments be prepared with **Pigmentum Caseinæ,** *q.v.*

In syphilis early application to primary sores, with large injections simultaneously into the buttock.—L. ii./08,505.

P1 **Tablets Arsamin** contain one grain. P1 **Capsules Arsamin** 1 and 2 grains, also P1 **Capsules Arsamin** 1 grain with **Blaud Pill** 5 grains and with **Quinine** 3 grains are prepared and are useful for treatment in cases where the added drugs suggest themselves.

For Methods of Testing Sodium Arsanilate for inorganic Arsenic, see Vol. II.

In Trypanosomiasis.—Thomas of Liverpool first applied Atoxyl in trypanosomiasis. 2 Cc. of saturated solution (about 20%) as first dose—repeated after 18 days. Immediate effect was magical, but it only helped the sufferers in dying.—L. ii./07,1161. Koch thought it to be a specific.

Initial doses of ½ Gm. increased to 1 Gm. have been given.—L. ii./07,767.

p-Amino-phenyl-arsonic Acid acts promptly on trypanosomes, the *meta*-Acid has less effect and the *ortho*-Acid no effect at all. Both the presence and the position of the Amino group are important factors.—L. ii./12,1822.

Divergent views as to the operation of the trypanocidal effect of the arsanilate.—Fortescue Brickdale, B.M.J. ii./12,1489.

Give hypodermically not *per os*, nothing gained by injecting into the spinal canal. Useless to prolong treatment for a period of several months. Arsanilate cannot be given in large enough quantity to act as a complete steriliser. It is uncertain whether any cures have resulted from Arsanilate alone.—Bagshawe.—L. ii./09, 1196.

Sodium Arsanilate plus Mercury.—Combined have been used without much favour.—*Ibid.* **Sodium Arsanilate plus Orpiment,** (Arsenic Trisulphide $As_2S_3 = 246{\cdot}10$) were also largely given. The trypanosomes probably never become resistant to inorganic Arsenic.—*Ibid.*

Sodium Arsanilate plus Tartar Emetic.—This appeared to be more effective than any other combination, the Arsanilate under the skin once a week and the Antimony Salt into a vein once or twice a week or in series. Previous administration of Caffeine before Antimony is advised.—*Ibid.*

In Syphilis early application is necessary. Large doses may produce blindness. ½ Gm. dose every other day should not be exceeded—10 days treatment, then 14 days interval. Primary chancres remained stationary even on prolonged treatment —B M.J.E. i./09,39, B.M.J. ii./09,381.

In locomotor ataxy with benefit. Not necessary to give intramuscularly, subcutaneously as good.—B.M.J. ii./09,204.

Relapsing Fever. Large doses have been given, *e.g.*, doses of from 9 to 23 Cc. of 20% solution.

Kala azar. Successful treatment by 3 grains every third day —B.M.J. i./09, 843.

Banti's disease treated successfully by injections up to 2 grains every second day —M.P C., Sept. 22/09, p. 322.

GENERAL REFERENCES TO SODIUM ARSANILATE.

In interstitial keratitis 0·25 to 0·5 Gm. once a week in mild cases, more frequently in severe, efficacious—not more than 6 Gm. in all to be given. A course of 12 injections usually cures or almost cures, treatment to be in conjunction with mercury intramuscularly.—S. Stephenson, L. ii./08, 728.

On carcinomata effect is sometimes most striking—tumour ceases to grow, then becomes smaller and harder In a case of epithelioma of the tongue the shrinkage was obvious. There is, however, not a proportionate increase in strength—in fact an asthenia is produced requiring treatment.—B.M.J. ii./08,1720.

In tuberculosis intravenous dose of 0·05 to 0·3 Cc. of 15% solution combined with small doses of Tuberculin.—B.M.J.E. i./09, 48, L. i./10, 176.

Elimination is by the skin and especially by the kidneys. May cause transient albuminuria. Part may be taken into the body, but the bulk is in the urine unchanged or as allied substance.

Ehrlich pointed out that a drug can only be of value in infectious diseases, if taken up more readily by the parasite—bacterio-tropous (*syn.* ætiotropous)—than by the organism—organotropous. Many protozoa take up dyes—**Trypan Red** (from 1 molecule tetrazotised benzidene-mono-sulphonic acid and 2 molecules sodium naphthylamine-3 : 6-disulphonate) is active against trypanosomes.

He advised use simultaneously of a number of substances, *e.g.*, Atoxyl, Parafuchsin, Trypan Red and Trypan Blue,* chosen in such manner that their actions are concentrated on the parasites—distributed over several different organs. Combine a potent substance which will kill off the bulk of the trypanosomes with a weaker one, which will account for the few remaining trypanosomes, which otherwise would certainly cause a relapse in course of time Mercuric Chloride has been demonstrated a useful adjuvant to Atoxyl treatment—alone it (Mercuric Chloride) is incapable of complete curative action

In man the excretion of Atoxyl usually amounts to 50–90% within nine hours. The amount remaining in the body is to some extent decomposed so that after sufficient time has elapsed the ordinary toxic symptoms of inorganic Arsenic are produced. Fortescue Brickdale can see no advantage in giving in syphilis and the grave forms of anæmia a rapidly eliminated form of Arsenic in large dose rather than one which being slowly excreted can be given in small doses. In the case, however, of trypanosomes the organic Arsenic may play a different role. Here it is thought that a small amount combines, through the Amido group, with the proteins of the blood plasma, from which the Arsenic is set free by an oxidation process, and thus in a nascent condition kills the trypanosomes—B.M.J. ii./10,1598.

Cerebro-spinal meningitis treated intravenously.—B.M.J. i./10,193.

In chronic malaria, skin diseases and syphilis over 2,500 intramuscular injections of 2 Cc. of 15% solution (heated in an autoclave not in the open air) every second day during a fortnight, and then a rest of the same period. In venereal disease not specific, but by alternating with a soluble salt of Mercury reduction of amount of mercury necessary by at least half —L. ii./10,1257.

Atoxyl does not act *in vitro*, but it acts in the living body. Substances act differently in the body and the test tube.—L. i./13,1347.

Poisonous Effects.

Action of Atoxyl on the eye. Records of 95 cases of disturbance of vision. The ocular symptoms comprise a more or less marked diminution of sight power and the field of vision is concentrically diminished, but more on the nasal than on the temporal side. Ophthalmoscopic examination at first gave negative result save that the retinal arteries may be narrowed, the veins somewhat hyperaemic—later there is complete optic atrophy, with increased dimness of vision going to complete blindness. Alcoholism may predispose to Atoxyl amblyopia. Arsacetin, though less toxic, is less active therapeutically.—L. ii./10,1149.

For further details of action of Arsanilate and allied bodies on Trypanosomes *vide* 'Salvarsan,' by M. & W., p. 168 *et seq.*

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* **Trypanblue** $C_{34}H_{24}N_6O_{14}S_4Na_4$ = 960·662 has been proved successful in the treatment of piroplasmosis,—*biliary fever* or *malignant jaundice* of the dog (canine *piroplasmosis*) and *red water* or *Texas fever* of cattle (bovine piroplasmosis) It is also stated to be a certain and immediate cure for distemper, but we know of a case in which it proved useless. *Dose.*—Dogs 2 months old of 3 to 5 lbs. weight, 3 Cc. to 4 Cc of ½% Solution. From 10 lbs. to 60 lbs. weight, dose ranges from 3 to 20 Cc. of Saturated Solution (1% approx.). Subcutaneously, or in preference intravenously, into the vena saphena in the hind leg of a dog.

Cattle.—*Dose.*—100 to 200 Cc. Saturated Solution.

Chlorazol Blue 3 B is a color closely related and has been used instead of Trypan blue.

Arylarsonate Poisoning Treatment.

Large quantities of water (90 to 100 ounces) daily as well as electricity to the temples sufficiently strong to produce subjective flashes of light. For ten weeks daily for 4 to 6 minutes constant current of 3 to 10 milliamps, with an electrode on each temple. Vision steadily improved.—B.M.J. ii./10,623 (*c.f.* B.M.J. i./10,724 & 725).

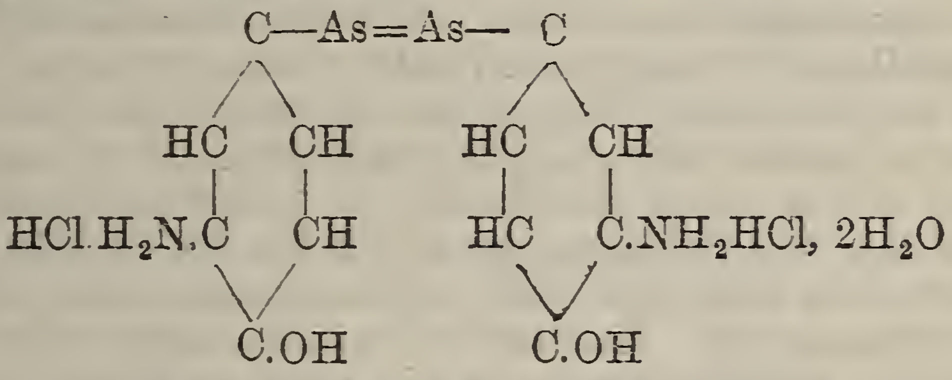
P1 **Hydrargyri Arsanilas.** MERCURY ATOXYLATE (MERCURY *p*-AMINO-PHENYLARSONATE). (BRIT. PAT. 8959 & 24428/1908, GERMAN PATENT 237,787). *Syn.* ASYPHIL. $(NH_2—C_6H_4.AsO.OH.O)_2Hg.=632·712$ I. Wts.

Dose.—$\frac{1}{2}$ to 1 grain (0·03 to 0·06 Gm.)—usually suspended in oil.

A white powder slightly soluble in water.

Thirty cases of syphilis derived benefit.—L. i./10,23.

P1 **Dioxy - diamino - arseno - benzol Di - hydrochloride,**—ARSENOBENZOL*, ARSEN-PHENOL-AMINE, ✱ARSENOBILLON (T.M. 368758), DIOXYDIAMIDO-ARSENOBENZOL DI-HYDROCHLORIDE, ✱KHARSIVAN (T.M. 363586), ✱SALVARSAN, EHRLICH-HATA, or '606,' is believed to have the constitution:—



Or written empirically $C_{12}H_{12}O_2N_2As_2(HCl)_2\,2H_20 = 475·064$.

For ***Dose and Methods of Injection*** see p. 195 *et seq.*

PATENTS.—Licences under the Patents, Designs & Trade Marks (Temporary Rules) Act, 1914, have been granted to two British and two French firms to use the German-owned British patents, the first application being heard Sept. 17, 1914.

The patents concerned are 3934/07 ("Improved process for the manufacture of Acidyl Derivatives of *p*-amino-phenyl-arsinic acids") 13,485/10 (New derivatives of *p*-oxy-aryl-arsinic acids), 5595/11 (Nitro-oxy-aryl-arsinic acids), 7865/12 (Derivatives of Diamino-dioxy-arsenobenzol, *i.e.*, Novarsenobenzol), and 8219/12 (an addition to the last mentioned).

Details of procedure in making the body are given in "Salvarsan" by M. & W.

The Board of Trade Licences in question entail the examination by biological tests by an approved authority. The Medical Research Committee undertook in the first instance examination of the preparations to satisfy the Board of Trade and rejected some samples.—L. i./15,766. Request for records of cases from practitioners giving serial numbers, etc.—*ibid*, 1360.

It may be noted that Patent No. 6322/15 dealing with Improvements in manufacture of *p*-oxyphenylarsinic Acid—an intermediate product in making Arsenobenzol,—is British owned. (C.D. i./16,663.)

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* The preparation is on the market under this name in hermetically sealed glass tubes each containing 0·6, 0·5, 0·4, 0·3, 0·2 or 0·1 Gm. filled with inert gas to prevent oxidation—if discoloured—either grey or brownish—must not be used.

✱ARSENOBENZOSOL is a Trade Mark: No. 326303.

The following are also ancillary to the main patents for making Arsenobenzol:—No. 11,625/11 ("Substituted Aromatic Arsines") and 15,931/12 ("Arseno preparation").

Further, Patent 17,619 of 1907 entitled "Reduction-products of *p*-amino-phenyl-arsinic acid and its derivatives" is German owned. The substance referred to in this patent is known as '418" (Ehrlich's number), and is similar to Arsenobenzol. A French house made application for the avoidance or suspension of the patent with the object of introducing improved bodies.—C. D. March 27/15.

TRADE MARKS: "SALVARSAN" and "NEOSALVARSAN."

No. 310235 for the former and Nos. 340386 and 340387 for the last-mentioned have been "suspended"—the suspension being in favour of British houses to whom licences to use the patents have been granted.

Introduction.—Ehrlich and his assistants (notably S. Hata of Tokyo) conducted research (*vide* "Die Experimentelle Chemotherapie der Spirillosen"), which led finally to the introduction of Arsenobenzol for treatment of syphilis and many other affections.

Treatment with this chemical compound of a person infected with syphilis it was hoped would effect a "sterilisation of the system."

(Ehrlich's first Salvarsan he called No. 606 in 1910, but information as to how long he worked on these preparations up to that date is not forthcoming. In 1913 he brought the number up to 1206A (Salvarsan Sodium, *q.v.*), that is another 600. Reckoning this period (from 1910 to 1913) as 900 days, this means a new preparation built up, examined pharmacologically and tested clinically every 2/3 of a day. The statement is staggering to anyone who has worked in a laboratory and almost unbelievable.—Gordon Sharp, P.J.ii./15,756.)

Hata conducted his investigations with this and other chemicals on the spirilla of relapsing fever in rats and mice: subsequently on fowl spirillosis and the spirilla of syphilis. In the experiments a series was inoculated with spirilla-infected blood, and the following day the blood was examined microscopically to ascertain presence of the parasites. The animals were then inoculated with the substance to be examined. Blood was removed daily and examined for presence or otherwise of spirochetes. The infecting blood was diluted as a general rule to the utmost, and yet not too dilute to prevent easy recognition in the animal the following day.

Trials of substances under examination were conducted by injecting, usually subcutaneously, on the day following the inoculation, varying doses of the preparation—determined by previous trial on similar healthy animals. The spirillar content was then determined daily. If the substance was active the spirilla disappeared in one or two days; if insufficiently active they reappeared sooner or later.

A large number of Aniline dyes were tested in this manner on spirilla of relapsing fever. Methylene Blue in dilution 1 : 6,000,000 was sufficiently powerful to cause cessation of movement *in vitro*, but in the experiments upon animals it was found that about 500 times as much was necessary as was required *in vitro*. The dye was found in fact to be much more strongly **'organotropic'** then **'parasitotropic.'**

With regard to Arsenicals in the treatment of relapsing fever in mice, Hata was only able to obtain curative action with Atoxyl by feeding as much as seven days in advance and seven days subsequent to infection. Atoxyl was found to be incapable of destroying protozoa, *e.g.*, trypanosomes *in vitro*. Arsenobenzol, on the other hand, both with mice and rats infected with relapsing fever, had powerful action as a preventive and curative.

In regard to fowl spirillosis the chemical in question had a curative dose intramuscularly of 0·0035 Gm. per kilo body weight if treated the day after inoculation. It gave better results than Atoxyl, Arsacetin, etc.

Tabulated results of treatment by Arsenobenzol of rabbits inoculated with syphilis in the cornea are provided by Hata. The injections were given intravenously in amounts varying from 0·006 Gm. to 0·04 Gm. per kilo body weight about two months later—*i.e.*, after complete corneal opacity had set in. Healing occurred even in the case of the low dose of 0·006 Gm. The results were not however conclusive. Research is more fruitful in the case of artificially induced scrotal syphilis when a pronounced chancre has been produced, as by this means after the injection has been given spirochetes may be searched for systematically. Between 0·015 Gm. and 0·01 Gm. per kilo body weight intravenously sufficed to sterilise the animal's system sufficiently to prevent recurrence.

Salvarsan was first tried (by Hata) on a human case at the Imperial Institute at Tokyo.

In the "Note on the Chemistry of the Injections" (*see Vol. II.*), we have calculated the exact quantities of alkali required to neutralise or dissolve given doses of Arsenobenzol Di-hydrochloride according as a suspension or solution is desired, thus reducing the possibility of adding marked excess of caustic alkali, which would be (and probably has been) attended with grave consequences to the patient if injected in the gluteal muscles, subcutaneously or by the intravenous method.

Arsenobenzol solutions kill protozoa *in vitro*, and the $\frac{C}{T}$ dose ratio, *i.e.*,

$$\frac{\textit{Curative dose or sufficient to destroy all parasites}}{\textit{Toxic dose or Max. dose which patient can tolerate}}$$

for the substance is satisfactory.—Ehrlich maintained that this ratio must be $\frac{1}{3}$ or less for a drug to be of value in this type of disease.

The percentages of deaths and of evil after-effects consequent on the treatment has undoubtedly been small when we take into account the nature of the substance and the technique required in its administration.

A few phrases occur in the literature :—

Chemotherapy.—" The principle of this is to employ chemical substances infectious diseases in which the natural recuperative powers of the system assisted by the formation of specific antibodies, are unable to bring about a restoration to health. All the early preparations acted destructively on the antibodies, but the new substance was found in its action on spirillosis in animals to hinder the development of parasites whilst not being harmful to the patient, at least in the doses required to destroy the parasites.

Parasitotropic Chemicals possess a strong avidity for the parasites and will kill them in the living being without injuring the tissues or organs in contradistinction to *organotropic* substances.

Ehrlich, in his division of chemical bodies, points out that all substances which are parasitotropic are *also poisons to the living organism, i.e.*, are also organotropic. Practically, therefore, one can only use as curative bodies those in which the *organo and parasitotropic properties* are in the right proportion.

A very large number of trials, in particular in the study of trypanosomiasis, showed a comparatively small range of chemical bodies having power of fixing trypanosomes. They fell into three classes: (1) Arsenic and Antimony Compounds; (2) certain Azo-dyes; (3) certain basic triphenyl-methane dyes, *e.g.*, Para-fuchsin, Methyl Violet and Pyronin. With a body of one group it was possible to produce a specific immunity in these protozoa against substances of the same group, but not against bodies in the other groups.

The action of Arsenobenzol on spirochetes is due to the presence of OH groups, which combine with the corresponding haptophore groups of the parasite.—B.M.J. ii./13,1450.

Therapia Sterilisans Magna is a phrase used by Ehrlich to denote the rapid killing off of all the specific germs by introducing a sufficiency of a parasitotropic chemical.

It is not improbable that during a lengthy treatment (with comparatively small dosage) with a poison like Arsenic that micro-organisms gradually become tolerant to it—they become in fact Arsenic-fast, whilst the tissues of the body, their host, do not get the opportunity to recover before they are exposed to subsequent fresh infection.

The most brilliant results *in vivo* with Arsenobenzol are obtained when the spirillar disease is at its height; the body is saturated with the specific organisms which produce antibodies, and the more organisms the more antibody.

Unfortunately this *Therapia sterilisans*, except in rare instances, has not proved capable of realisation. It is exceptional that a single dose of Arsenobenzol cures an attack of syphilis, in fact, three or four injections may not cure; but it is the most powerful weapon we have against spirochetes.—Pr. July, '12, p. 78.

Manufacture.—*p*-Oxyphenylarsonic acid—$C_6H_4.OHAsO(OH)_2$ on nitration and subsequent reduction under certain conditions produces a condensation of two molecules forming ultimately the Dioxy-diamino compound. This base is then converted into the Di-Hydrochloride.

Vide Patent Specifications *antea* for further details.

Commercially, free and combined Sulphur have been found in it.—F. L. Pyman, C.D. i./20.404.

Salvarsan becomes inactive if the NH_2 groupings are methylated—J. M. Fortescue-Brickdale, B.M.J. i./15,106.

The compound forms a bright yellow powder containing 31·6% approximately of Arsenium.

Soluble in water 1 in 5 forming a thick syrupy liquid with strongly acid reaction; 1 in 3 Methyl Alcohol and in Glycerin; 1 in 12 in Ethyl Alcohol. Insoluble in Ether.

The Di-Hydrochloride may be converted into the basic substance Dioxy-diamino-arsenobenzol (No. 592 in Hata's series) of the formula $C_{12}H_{12}O_2N_2As_2=366·046$ by treatment with alkali. We shall deal with this later, but may here define the base as an unstable, easily oxidisable, *insoluble* substance containing 40·96% of Arsenium —readily soluble however in Alkalis.

According to one authority, if the preparation is rendered very slightly alkaline—almost neutral—the solubility is at its minimum; this amount of alkalinity corresponds very closely with that of the blood and tissues. Probably the *relatively low toxicity in comparison with other Arsenic preparations is due to the fact that it is so insoluble in the blood.* This authority thinks that no matter in what form the substance is introduced the solubility is never more than 1/1000 per cent. The concentration in the blood, therefore, can never exceed this slight amount.

Attention may also be drawn to the "parasitotropic" importance of the unsaturated trivalent Arsenic—as is seen in the structural formula (compare, *e.g.*, the As^{v} in *p*-oxy-phenyl-arsonic Acid or in "Atoxyl," "Arsacetin," The Cacodyl compounds, etc.). The fact of the OH being in the *para* position to the Arsenium in the formula is also of importance.

It is stated that almost 200 derivatives of Phenylarsonic Acid were prepared, examined biologically, and tried therapeutically subsequent to Arsenophenylglycin, which had the number 418, before the most active, *viz.* No. "606" had been synthesised.

An immunity to syphilis does not exist; neither immunisation nor serum-therapy are possible; hence the value of the new 'chemo-therapy.' Syphilitic infection, according to Neisser, takes place throughout the entire system very rapidly after it is created—indeed, there is probably a saturation of the system through the blood stream at the moment of infection.—Neisser.

Uses.

Primary, secondary and tertiary forms of syphilis, as also their accompanying symptoms have been well treated by Arsenobenzol.

The recorded marvellous disappearances of chancres, ulcerations on the genitalia, tongue, tonsils, gums and elsewhere, and eruptions are now common knowledge.

In *early* stages of *para-syphilitic affection*—incipient tabes, early paralysis and epilepsy of syphilitic origin the preparation has also been used. In various tropical diseases it has also met with success.

Primary cases where chancres exist frequently healed in 48 hours. Large papular syphilides are, however, less amenable, two injections being sometimes necessary. Bone disease reacts promptly. Swellings in the vessels are reduced. The keratitis of hereditary syphilis requires local treatment in addition with an Arsenic preparation.—From a case reported in "Salvarsan" by M. and W., p. 11.

'Visceral syphilis, gummata of the testicle, syphilitic tumours of the larynx, icterus, epileptiform attacks of syphilitic origin, cerebral syphilis, paresis of the trochlearis and abducens muscles and pulmonary syphilis favourably influenced.'—*ibid.*

Hereditary Syphilis.—A case of hereditary syphilitic eye affections, keratitis and iritis After 0·4 Gm. gradual improvement. Wassermann's Reaction, however, still + after 18 days. ("Salvarsan" by M. & W., p. 14.)

It has been reported that the infant child of a syphilitic mother has been cured by injecting the mother (no arsenic found in the milk). The surmise is that the sudden killing off of the spirochetes sets free a large quantity of endotoxins. This would produce antitoxins, and these latter may have been carried over by the milk. It has therefore been suggested that syphilitic mothers must nurse their children and from the beginning should be injected with Arsenobenzol, or if this is not practicable a syphilitic wet nurse may be obtained for the infected child, and immediately before nursing must be injected with the substance.

As an alternative both mother and child should be injected

For every kilo body weight the dose suggested for the infant was 0·008 to 0·01 Gm.

A hereditary case—a child of two months. Papulo-pustular syphilide with infiltration of the lips, coryza and osteochondritis on one upper arm. Dose, 0·02 Gm. intramuscularly. All the symptoms of disease had gone in 12 days.—(*ibid.*, p. 15.)

A similar case—a badly syphilised pregnant woman shortly before delivery received an injection. Child 7 days after birth was normal. —Mark Wardle, B.M.J. i./11,1372.

Results of treatment of the mother in the cases of very young children often only 'superficial.' The effects of the maternal injections on the deeper or visceral lesions of hereditary syphilis are quite unfavourable. They aggravate the disease and sometimes kill the infant.—B.M.J. ii./11,765.

Four cases of hereditary syphilis. Three young infants, and one lad aged 15 years. In one infant 0·02 Gm. was injected deeply into the right buttock, and this was followed seventeen days later by another injection (0·06 Gm.) in the right scapular region. The result was that the infant, which appeared likely to die, became healthy and plump. In the other two infant cases, the mothers received injections with satisfactory results to the infants. The boy of 15 received several injections, the initial dose being 0·1 Gm. His condition improved considerably.—J. H. Sequeira: *British Jour. Child. Dis., Feb.*, 1911. —*per* Pres., 1911,145.

S. Stephenson thinks Salvarsan can have no harmful effect upon the optic nerve, healthy or diseased. Its use does not necessarily prevent the subsequent appearance of syphilitic disease of the eye. In the treatment of interstitial keratitis due to inherited syphilis, a series of injections required, a single injection seldom produces any marked effect.—B.M.J. ii./12,1036; L. ii./12,525.

In syphilitic iritis good results.—Angus Macnab, C.D. i./13,204.

Parasyphilis must be regarded as syphilitic in origin. Attempts to reach the *Spirochaeta pallida* in the cerebro-spinal fluid have shown that Salvarsan causes meningitis.—L. i./14,230.

Parasyphilitic Conditions.

Tabes dorsalis of recent onset in a woman treated. Wassermann's test previously + became almost completely − with marked improvement.—L. i./11,1208.

Sixteen cases of general paralysis—in four distinct benefit. In cases of this kind, of course the only hope is early treatment—in the later stages the brain and cord are irreparably damaged and even a staying of the process would not mean cure.—Glasgow Med. Jl., Nov. 1910, p. 231 *et seq.*

In parasyphilis, Salvarsan of little use.—M.P.C. ii./11,552.

TABES.—The future treatment should aim at discovery of some Arsenic compound (blander than Salvarsan) which could be introduced straight into the cerebro-spinal fluid and kill the syphilis organism in its lair without at the same time slaying the host.—Prof. Halliburton, B.M.J. ii./16,610.

Grainger Stewart mentions 20 cases of tabes. Some improved under Salvarsan.—B.M.J. i./15,200,215.

Treatment of General Paralysis of the Insane by Arsenobenzol alone, and combined with Human Serum. Antibody Formation Theory.

It is known that the milk of a syphilitic mother under treatment by Arsenobenzol cures the symptoms of syphilis in her infant. It has been concluded from this that the cure has been effected by antibodies and not the drug because, if injected intravenously, the latter is all excreted in about four days. With regard to the production of this antibody, Ehrlich stated (*vide* B.M.J. i./11,382) that Arsenobenzol kills the spirochetes, and that the dead spirochetes liberate a protein which stimulates the production of a syphilitic antibody, and that on the extent to which this is done the cure of the syphilis depends. Now the results of the use of Arsenobenzol in general paralysis (parasyphilis) have not been so successful as in most syphilitic conditions, and this is possibly due to a deficiency of antibody. This is a reasonable hypothesis, because the number of spirochetes (whose death would liberate the necessary protein) is probably small, seeing that none have ever yet been found. It is also possible that they have retreated into the cerebro-spinal fluid, where the Arsenobenzol cannot come into a very efficient contact with them. Both these conditions would result in a deficiency of antibody. The serum taken from a patient who, has been intravenously injected with Arsenobenzol for secondary or tertiary syphilis from three to fourteen days before is full of antibody, and if in its turn it be injected into a case of general paralysis which has already been treated with Arsenobenzol, and the injection be occasionally repeated, it may supply the curative agent which is wanting. If acute symptoms be absent, the most that successful treatment can do is to stop the progress of the disease. If it is proved that the course of the disease is checked, then treatment could be applied to cases in the earliest stages before any serious damage has resulted. Thanks to the Ross-Jones test for proteins in the cerebro-spinal fluid, lymphocytosis and the Wassermann reaction (all of which should be applied to persons with nervous and mental phenomena who have had syphilis), it is possible to diagnose the disease early and to exclude it with certainty.

The serum is obtained by drawing off blood with scrupulous antiseptic precautions from any prominent vein at the elbow. From about 30 Cc. of blood about 15 Cc. of serum is obtained. The tubes with the blood are kept on ice for 24 hours. It is centrifugalised in sterilised tubes to remove blood corpuscles and kept on ice until required. A broth culture is made from it to test its sterility. Ten Cc. of this serum is subcutaneously injected into the abdominal wall, and another dose of 20 Cc. given within a fortnight. There have been no toxic serum results or reaction after either dose.

One case of general paralysis with acute symptoms improved in a striking manner after Arsenobenzol treatment, but in other cases, without acute symptoms, there has been little or no change in the dementia and physical phenomena. It will be interesting to note whether the addition of human serum containing antibody confers increased power to the Arsenobenzol treatment of parasyphilis or not. The results obtained in yaws, *vide infra* by use of serum from a blister from a person who had himself been treated by serum only has demonstrated the value of the antibody in treatment, and has encouraged us to hope that if the toxæmia of general paralysis be primarily derived from the *Treponema Pallidum*, benefit will be obtained.—Robertson, B.M.J. i./11,585, see also *ibid*, p. 809—Salvarsan Serum gave improvement in a case.

Seeing that healing continues some time after all Arsenic has disappeared from the urine, this is probably due to the antibodies produced and these antibodies are not eliminated rapidly from the system, if at all.—Stopford Taylor and MacKenna, L. i./11,1412.

Parasyphilitic disease treated by intrathecal injection of Salvarsanised serum. A. Turner tried in eight cases and thinks it too early to say whether the method would replace older methods or even aid results.—B.M.J. i./15,199.

See also paper by H. Campbell and Sir Charles Ballance, L. i./19,608.

Use in Malaria, Yaws, Frambœsia, Leprosy, Plague, Pernicious Anæmia and other diseases—

It is thought that not only is the substance specific for syphilis, but also that it probably acts against *Spirillosa* in general. All diseases which are amenable to Arsenic could be treated with it.

Tertian Malaria has been cured but quartan does not seem to respond in the same way.—W. H. Willcox, B.M.J. i./16,473.

Yaws.—Intramuscular use preferred to intravenous. The method of use was to mix the powder with 10 to 12 minims of Glycerin, add hot Sodium Chloride Solution (0·5%) to make 10 Cc. and dissolve the remedy in this diluent.—P. R. Cockin, L. ii./13,1609. See also P. Harper, L. i./14,370, B.M.J. i./12,14, and B.M.J. i./16,473.

Frambœsia, five cases (3 adult, 2 children) in Trinidad injected with 0·6 Gm. in an emulsion of 5 to 6 Cc. sterile Olive Oil for the adults injected deeply into the muscle of the buttock. Improvement in 24 hours, the yaws tubercles drying up from the periphery.

In the light of the view that Arsenobenzol creates an antibody by rapidly destroying spirochetes an experiment was tried. A cantharides blister was put on in two cases and the serum from a blister was injected into several cases of yaws—the adult dose being 16 Cc.—the serum acted rapidly. Several other cases were treated by this serum with good result. This is the first instance known of a drug producing an *Antitoxic Serum* with curative properties. The curative substance whatever it be seems to have the power of increasing itself.—B.M.J. i./11,360,382.

Among 900 cases of frambœsia in Surinam there were only three unsuccessful.—L. ii./11,1303.

Vincent's angina.—A throat swab dipped in Glycerin and this in the powder and rubbed on to the affected parts in the throat. Not painful. Relief afforded after a few hours.—L. ii./13,1120.

Leprosy has been treated in Russia. It is recorded that two young men (20 years of age) who had been lepers for ten years and were both severe sufferers from photophobia received injections. Their fear of light disappeared, and temperature fell. The reduction remained permanent. Ulcer on the leg of one patient showed signs of cicatrisation.

On leprosy seems to have no beneficial influence.—B.M.J.E. i./11,80.

In a case of a form of leprosy (a youth of 18) 0·3 Gm. was given. The skin all over the body began to desquamate with the formation of large scabs on the ulcer. These scabs in time detached leaving healthy and smooth looking surfaces, getting better from day to day. The patient never showed such signs of improvement with other remedial means before.—Shivdas, Bombay, Feb., 1911.

In leprosy 9 cases, the injections being intramuscular suspension of the dose in 6 to 7 Cc. of sterile Olive Oil, using needle of wide lumen. Early cases should be treated in preference.—B.M.J. ii./11,655.

Pneumonic plague in a female.—Temperature 104° F., 0·5 Gm. given. Four hours later temperature fell to 97° F. but patient ultimately died.—Pres., 1911, 146.

In *pernicious anæmia*, possibly a trypanosome disease. Two cases each received four doses 0·2 to 0·3 Gm. intramuscularly. Marked improvement both as to blood and general symptoms. Red corpuscles increased, in one case from 1,700,000 to 2,500,000 and thence to 3,580,000; hæmoglobin increased from 50 to 70 and 78%; white corpuscles similarly 5,600 to 8,000, and blood pressure rose from 100 to 118-135. In the other case red corpuscles increased from 1,460,000 to over 4,000,000; hæmoglobin from 45 to 88%; white corpuscles 4,200 to 7,600. Justifies further trial in all cases of pernicious anæmia.—Byrom Bramwell, B.M.J. i./11,547,792.

11 undoubted cases satisfactorily treated with Salvarsan 0·3 Gm. intramuscularly,—in no case intravenously.—Byrom Bramwell, B.M.J. i./13,1093. see also *ibid.* i./15,406. (This authority introduced the Arsenic treatment of pernicious anæmia in 1875).

Pernicious anæmia in a woman treated by two doses of 0·3 Gm. at first improvement, then sharp reaction, fall in temperature (destruction of some virus ?), followed by recovery.—B.M.J. ii./12,1659.

Unsuccessful. At first there was increase in the number of red cells, but the second dose produced opposite effect. Subsequent improvement under Autogenous Vaccine.—B.M.J. i./13,71.

Salvarsan not advised, as it is best given intravenously, and there would be danger in its use in pernicious anæmia.—W. H. Willcox, Pr. Sept. 1913

In *small-pox*, no influence; *typhus* favourable; in *relapsing fever* more active than in syphilis.—B.M.J. F. ii./11,4.

Bilharziosis and *glanders* have been cured by one injection.—P. Ehrlich L., ii./11,1303.

Chorea and Salvarsan.—B.M.J.E., ii./11,75.

In sarcoma subcutaneous and intravenous injections have given some suggestive results.—L., ii./11,1438.

Anthrax treated by Salvarsan.—B.M.J. ii./13,358. An inquest at Bradford on a case of wool-sorters disease treated with 0·6 Gm. Salvarsan intravenously and injections of Scalvo's Serum proved that the patient was cured of anthrax but died after the Salvarsan. Post-mortem showed there were signs of chronic Bright's disease. The Salvarsan was given as a last resort as the man did not improve with the Scalvo's Serum.—B. & C.S., Oct. 10 and 17, 1913.

Scarlet fever treated by 0·1 to 0·3 Gm. for children, 0·5 Gm. for adults—mostly intravenously.—Antipyretic effect, but rash not checked. Good effect on the general condition.—Klemperer & Woita, Therap. d. Gegenwo., May, 1912, per Pres., Oct., 1912.

Rat-bite fever successfully treated by Novarsenobillon 0·4, 0·6 and 0·9 Gm. at intervals.—G. C. Low and R. P. Cockin, B.M.J., i./18,203.

Kharsivan and Neo-Kharsivan in diseases other than syphilis—lupus sycosis and eczema.—G. Stopford-Taylor, B.M.J. ii./18,431.

Specific Nature of the Treatment.

Of 12 infected monkeys treated with '606' some time after the initial symptoms had disappeared, five could be reinfected some months later with human syphilitic material, and after the usual incubation period they presented typical primary lesions, although they had certainly been originally healed; but there is evidence that re-inoculation with syphilis may take place before the first infection cured.—Salvarsan—M. & W. p. 19.

Ehrlich (Salvarsan by M. & W. p. 20) made certain statements regarding the *specific action* of Salvarsan. With a sufficient dose the *spirochetes disappear* in 24 to 48 hours, if longer it is due to the dose being insufficient or insufficiently absorbed, or that the type of spirochetes to be dealt with are Arsenic-resistant. A *second fact* proving the specific action is the formation of SPECIFIC ANTIBODIES (*c.f.* in particular the formation of these in the case of the cure of a syphilitic child through the medium of the mother's milk). The *serum of patients* cured by Salvarsan is curative by injection, but is insufficient to act as an absolute cure. If one out of 1,000 spirochetes remain behind, this is quite sufficient to produce recurrence. A *third point* to show the specific action is the result with the WASSERMANN TEST, which, in 90% or more of cases, becomes negative after the injection; but, in some cases, early stages in primary affection and occasionally in malignant affections the result is exactly in the opposite direction, negative before and positive after the dose. Ehrlich explained this fact thus, in such cases the number of spirochetes is too small to bring out the reaction, but after the extinction of the spirochetes by the injection the entire amount of endotoxins is absorbed, and hence produces a reaction. Wassermann's reaction is therefore a reaction of the organism on the absorbed contents—assimilation products, endotoxins—of the spirochetes. As a *fourth proof* of specificity Ehrlich draws attention to the *rapidity* with which the medicament acts. A patient with a gumma on the tonsils, which had been treated for a couple of months, without success, had an injection; within five hours the patient could eat a slice of bread and butter. A patient with iritis exudativus could only see a finger at a metre's distance, three hours after 0·4 Gm. he could see himself in the glass at 5 metres, and could read small print 20 hours afterwards. According to Ehrlich one has to assume, in the specific removal of pain which Salvarsan exercises, that the pain is due to secretions of the spirochetes which are neutralised by Salvarsan in a manner like toxin is neutralised by antitoxin.

Average Dose (*Intravenous*) for adult *males*.—0·4 to 0·5 Gm., for *women* 0·3 to 0·4 Gm. An injection of the same dose may be **repeated** two, three or four weeks later. In feeble patients or where the central nervous system or heart is affected smaller doses (0·1 to 0·3 Gm.) may be given, and repeated, if the first injection has been well tolerated, after a few days.

For the series of injections some favour 5 to 10 successive doses at intervals of 8 to 10 days and of uniform dose. Leredde gives the following examples:—

Commencement of primary and secondary stage (Wassermann Reaction still negative) give 3 injections of 0·6 Gm. each in the space of 17 days (8 days between each).

Secondary and Tertiary Stage (Wassermann Reaction positive). Give 4 injections with 8 days interval between of gradually increasing doses from 0·2, 0·4, 0·5, to 0·6. Gm. If the febrile reaction following one of the injections exceeds 101°, the next dose must be of the same and not of greater strength.

Three series of injections should be given with two months interval between each. The dose may perhaps be increased a little in the second and third series. In this intermittent form of treatment Arsenobenzol is to be continued until the Wassermann reaction is negative.

Intramuscular injection.—The injection of less than 0·5 Gm. may not, in some cases, have a sufficient remedial action. To prevent relapse an intravenous injection should be given after a few days, or at latest after four weeks. In incipient tabes in the very first stage, as well as in nervous disorders, 0·3 to 0·4 Gm. suffices.

Fractional doses.—Intramuscular injections of 0·1—0·2 Gm. suspended in oil, are made every second day until a total of 1·2 Gm. has been injected.

For children doses of 0·2—0·3 Gm. are given. For infants doses of 0·02—0·05—0·1 Gm. have been employed.

N.B.—All solutions and suspensions of *Salvarsan must be freshly made with aseptic precautions.* For the importance of Fresh Distilled Water *vide* Vol. II.

An entire dose of 1·0 *to* 1·4 *Gm. may be taken as a general (adult male) dose,—given in two or three fractions over a period of three to six days ; one or two of these must be intravenous. With a less dose the lesion may be cured in some cases, but many will relapse.*—L. i./11,725.

The main issue is to counteract infection as rapidly and completely as possible. Experiments have proved that trypanosomes may accustom themselves rapidly to an *insufficient* dose.

The chance of toxic effects following a therapeutic dose is remote, as the '*dosis maxima bene tolerata*' is six times as great as the '*dosis curativa.*'—Salvarsan by M. and W., p. 18.

The ***highest dose*** employed by early workers was 0·0096 Gm. per kilo body weight. A 12-stone man would therefore receive at most 0·8 Gm.

The *toxic dose* subcutaneously for rabbits is said to be 0·15 Gm. per kilo, *i.e.*, approximately 10 to 15 times the highest dose used in man. As an average rabbit weighs 2,000 Gm., the toxic dose for these animals would be about 0·3 Gm. We had this confirmed.—W. H. M., 1914.

A *much larger* amount has to be *used to heal an early chancre than to cure* an extensive gummatous ulceration *completely.*

T. Pallidum observed shedding granules—possibly spores and seen as result of inefficient first dose.—the second dose should prevent the storing up of resistant forms and prevent relapses.—B.M.J.,ii./11,1174.

Interval between doses. — A full dose of Salvarsan (0.6 Gm.) is not completely excreted after three weeks—a trace then remains in the body. An interval of four weeks should elapse between full doses.—W. H. Willcox, B.M.J. ii./16,476.

The Principal Methods of Injection are :—

(1) **Intravenous.** (2) **Intramuscular** into the gluteal muscle.
(3) **Subcutaneous** into tissue adjoining bases of shoulder blades.

(1) Intravenous Injections.

Dose.—As a rule less of the preparation is used than by the other methods, the average being 0·3 to 0·4 Gm. for women and 0·4 to 0·5

Gm. for men, *diluted to about* 200 *to* 300 *Cc.* repeated in two, three or four weeks. See also Average doses, *antea.*

Preparation of the Injection.

Arsenobenzol 0·6 Gm. is added to about 30 or 40 Cc. Sterile Distilled Water contained in a 300 Cc. stoppered cylinder (a few glass beads added assist in dissolving). Dissolve by shaking thoroughly, add 1·2 Cc. (about 23 drops) of 15% *w/w* **Sodium Hydrate Solution.** A precipitate is formed which redissolves. Dilute the clear yellow solution to 300 Cc. with Saline Solution of 0·5% strength. One or two more drops of Sodium Hydrate may be required.

Note.—0·5 Gm. requires 19 to 20 drops of the Sodium Hydrate Solution.
0·4 ,, ,, 15 to 16 ,, ,, ,, ,, ,,
0·3 ,, ,, 12 ,, ,, ,, ,, ,,
0·2 ,, ,, 8 ,, ,, ,, ,, ,,
0·1 ,, ,, 4 ,, ,, ,, ,, ,,

The minimum amount of alkali should be employed as found experimentally sufficient to dissolve. The quantity of Alkali thus added converts the body into the *Di-Sodium Compound.*

Each 50 Cc. of the solution contains 0·1 Gm., *i.e.*, 150 to 200 Cc. form an average dose for women, and 200 to 250 Cc. for men.

Alternative Method.

In our experience it is best to add Soda Solution q.s., to make the base—i.e., 0·5 *Cc. for* 0·6 *Gm., mixing thoroughly; dilute with a little Saline and then add the Sodium Hydrate Solution q.s. to dissolve (about* 1·25 *Cc. in all), finally diluting to* 300 *Cc. with Saline solution.*

For a note explaining the Chemical reactions on treating Salvarsan with Alkali, see Vol. II.

Administration of the Injection.

A sterile douche tube to hold 300 Cc. or less of the Solution and graduated in 50 Cc. is connected with a rubber tube and cannula arranged for transfusion. An additional vessel containing Normal Saline is useful.

The process may be varied from this *gravitation method* to one in which slight pressure is employed—by a syringe piston attachment.

The injection should be given at about 105° F., *i.e.*, a little above blood heat. It is generally painless.

The arm supported in a comfortable position, a prominent vein at the bend of the elbow is selected and the skin over it painted with a solution of Iodine in Chloroform (1 in 15), a rubber band is then applied to the upper arm so as to retard the venous return without abolishing the radial pulse, and the patient made to clench and unclench his fist a few times to make the selected vein stand out well—the intravenous injection is then made in the usual way. As a general rule, about 30 Cc. per minute can be safely given, *i.e.*, the injection occupies about 10 minutes. A little Saline solution is allowed to flow into the vein, this is followed up with the amount of Salvarsan solution desired, and finally more saline is passed in to clear the needle and neighbourhood of the remedy.—L. i./11,726

Make sure that the needle is in the vein otherwise tissue may be infiltrated and inflammation be caused. *c.f.* B.M.J., i/11,332.

Patients should be treated in bed and observed for at least three days. If patient shows during administration any signs of collapse, injection should be stopped at once.

J. Ernest Lane refers to two errors in the intravenous technique—one the introduction of air by error, the other the danger of blood clot. With regard to the latter, it has been recommended by some to ascertain if the needle is properly in the vein, that a little of the blood be allowed to run back into the needle until it makes its appearance through the glass inspection window (for air bubbles) in the rubber tube—this is to be deprecated as a direct invitation to the blood to form a clot which clot will then be forced into the circulation. —B.M.J. ii./11,676.

A rest in bed is desirable, but many patients can be up and about the day following and feel refreshed.

Intravenous Apparatus.

The Author's apparatus is arranged for all three forms of injection. —Contains "Record" Syringe with Platinum Needle 4 Cm. long which is adjustable by an adapter on to the douche tube and douche cylinder—this being graduated to 300 Cc. in 50 Cc.'s. Contains also the necessary Reagents (Acid and Alkali) basin, rod, etc.—C.D., Dec. 10/10,857.

The following have also devised apparatus for use:—

O. Leyton.—L. i./11,21. *H. W. Bayly.*—L. i./11,153. The irrigator containing the injection is surrounded by a hot water jacket.

L. W. Harrison.—B.M.J. ii./18,517; see also L. i./11,727.

A. Fleming & L. Colebrook.—The three-way tap fits on to the (metal) nozzle of a "Record" syringe, instead of the *glass* nozzle of an all glass syringe. A useful air-bubble trap in the india-rubber tube of a capacity and shape to allow solution to pass round it instead of driving it in front.—L. i./11,1631.

A. J. Evans.—A douche made in form of a Dewar's double flask is useful, as the contained solution retains its temperature for a long period of time. Suitable also for continuous transfusion of saline solution into the rectum or tissues.—L.i./11,1207; B.M.J.ii./11,220.

J. E. R. McDonagh.—A three-way attachment on to syringe. Injection is better than transfusion—occupies only about six minutes. —B.M.J. i./11,447.

T. W. Gibbard, Gravity Form (2 douches). Thermometer inserted in a T piece in the tube to observe temperature of the infusion. —B.M.J. ii./11,1294.

H. W. Whale uses a Syringe 100 Cc. capacity with several advantages. Two syringefuls suffice for a dose of the Neo compound or 3 for Arsenobenzol.—B.M.J. ii./13,1491.

H. W. Abbott gives a clear account of the technique in injecting Arsenobenzol preparations. His apparatus is a "gravity" one provided with a 40 Cc. douche tube to contain the Novarsenobillon (dissolved in 20 Cc. of distilled water), rubber tubing 40 inches in length and a special needle with point of correct bevel—neither too long nor too straight. The gravity method is both safe and simple.— L. ii./17,616

(2) Intramuscular Injections.

Preparation of the Injection.—(*a*) Alkaline Solution. —Triturate 0·5 Gm. Arsenobenzol in a sterile mortar with 19 drops of 15% *w/w* Sodium Hydrate Solution and dilute with Distilled Water to 5 Cc. or the desired volume. For larger or smaller dose use corresponding amount of Alkali (*c.f.* Intravenous Injection). The injection is made into the upper exterior part of the gluteal muscles. The injection should be made deeply and slowly, so as to avoid tearing and hæmorrhage of the muscles. The neighbourhood of the sciatic nerve must be carefully avoided.

(*b*) **Sterile Aqueous Solution of Arsenobenzol** 10%, also (*c*) Liquid Paraffin, Olive, Almond or Sesame **Oil Suspensions** 10% strength have been used*, as also (*d*) the **Neutral Suspension.** To prepare this suspension triturate *e.g.*, 0·5 Gm., in a sterile dish with 8 drops of Caustic Soda Solution 15% (*w/w*) and then at first drop by drop, with constant stirring the requisite quantity (about 5 to 10 Cc.) Sterile Water. (For 0·6 Gm. the final volume should be 10 Cc., otherwise it is too thick.—W. H. M. For all these a wide lumen needle will be wanted.) The fine suspension produced is tested with litmus paper for neutral reaction. According to the reaction a drop of Caustic Soda Solution or of Dilute Hydrochloric Acid may be added.

The *Intramuscular Injection* is directed to be followed by an Intravenous Injection, *c.f.*, Average Dose, p. 196.

Apparatus used.

For *intramuscular injection* a 10 Cc. sterilisable syringe with 10 Cm. needle may be employed. For subcutaneous use 4 Cm. needles are sufficiently long.

Blood must not escape from the puncture before injection. The injection must be made slowly to avoid dissociating the muscular fibres roughly, and it must be intramuscular—none of the liquid must escape into the surrounding tissues. The skin must first be wiped with Iodine Tincture. The part may be massaged afterwards to spread the injection over as large an area as possible.

The patient should remain lying on his stomach for a while. He should rest for three or four days, even after pain, which may last some hours, has ceased.

It has also been suggested to give the intravenous dose first to intensify the action.

Intramuscular injections into the *arm muscles* have also been practised.

Ulcerating gummatous syphilide (congenital) in patient 16 years old treated by 0·45 Gm. interscapularly, subsequently 0·2 Gm. into median basilic vein. Skin lesion healed later, but Wassermann's reaction still +, gave 0·27 intravenously. Later the Wassermann reaction. The neutral emulsion is very irritating to the subcutaneous tissues of some patients—the drug being not well absorbed, therapeutic effect poor, extensive skin necrosis sometimes following. Intravenous best.—G. H. Edington, L. i./11,1209

Intramuscularly Arsenobenzol produces great after pain; it is difficult to persuade a patient to have a second dose. Intravenously there is no trouble.—J. A. Butler, B.M.J. i./18,328.

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* The acidity of these preparations (*b*) and (*c*) is in our opinion an objection.

☞ **Oily Injections** are carried out in two movements as for insoluble Mercurials. Subcutaneously 0·3 Gm. in sterile Almond Oil gave good results.—B.M.J. i./11,100; ii./11,214.

(3) Subcutaneous Injections.

The subcutaneous method is occasionally used. If made perfectly neutral there is little pain, and in any case, pain in the back is better borne than in the buttock muscle. The best place for this method of injection is about midway between spine and lower end of the shoulder-blade. Injections in the chest are also given—in men into a fold of tissue below the nipple, in women below the mammary gland.

Subcutaneous injection is not so suitable as intramuscular where the skin is taut—*e.g.*, in young people or in emaciation—for these the intramuscular dose would be preferable. For several days a hard mass can be seen and felt, this gradually disappears.

Subcutaneous injections produce slow and protracted action. *Olive Oil Suspensions* are *non-irritating* if freshly made each time, and are to be preferred to Paraffin emulsions, as being more readily absorbed.

Not infrequently difficulty in breathing occurs, especially in plethoric individuals, owing to a spasm of the intercostal muscles. Emphysematous patients should have the injection intramuscularly.

Rectal Injections.

Ehrlich stated at the International Congress, 1913, that the action of Arsenobenzol on spirochætes is an indirect one, a third factor found in the body fluids being necessary. Levaditi found that living treponemas placed in an Arsenobenzol solution continue to live, but are destroyed if a trace of liver extract be added.

If the drug has to be taken up and transformed by the liver to become toxic to the treponema, the best mode of use may be intestinal, since all the veins of the intestines join the portal vein.—Sabouraud, *La Clinique* (13/4/13).

The volume of Solution should be moderately small, *e.g.*, 160 Cc. Patients should abstain from taking liquids altogether for three days. Ten minutes after the injection Morphine is to be given hypodermically.—Pres., Oct. 1912, 258.

Experience with rectal use in 125 cases. Administer with a rubber enema. Injection to be retained for 36 to 48 hours. Effects the same as intravenous results and free from danger.—B.M.J.E. i./13,80. See also M.P.C., Oct., 1914, p. 371.

Chorea, two cases. Successive doses of 0·10, 0·20 and 0·40 Gm. pronounced improvement being visible in both cases. Injected in 100 Cc. of 0·5% Saline Solution with 5 or 10 drops of Tincture of Opium, and introduced as far as possible into the rectum by means of a long tube. The fluid must be retained for four hours. Satisfactory.—Pres., July 1913, 227.

Eight cases with well marked cutaneous manifestations treated. *Dose* from 0·4 to 1·4 Gm. Results absolutely *nil*. One patient had 1·3 Gm. (presumably *total*) given daily in Suppositories for 11 days with Neosalvarsan 0·3 Gm. by gluteal injection. This was effectual. —B.M.J.E. ii./12,84.

P1 Arsenobenzol Suppositories.

Arsenobenzol 0·1 Gm., Cocaine 0·1 Gm., Almond Oil *q.s.*, Theobroma Oil to 1·0 Gm. Not to be kept more than 48 hours. Coat with beeswax as protective.—Pres.

Supsalvs.—A proprietary brand of Suppositories containing each 0·1 (adult) and 0·03 Gm. (infants).

Combined Salvarsan and Mercurial Treatment.

Most specialists now supplement the treatment with Mercurial injections. Start with an intravenous injection of 0·6 Gm., and five weekly injections of Mercurial Cream; a second Arsenobenzol injection (0·6 Gm.), five more Mercurial Injections and lastly another intravenous injection of **Arsenobenzol** (0·6 Gm.). No death or symptoms causing any alarm followed any of the 3,800 injections given at the Military Hospital, Rochester Row. Out of nearly 6,000 injections given by American Army surgeons only one death attributable to **Arsenobenzol.** In those suffering from disease of the central nervous system, of the heart, lungs or other viscera caution must be exercised.—T. W. Gibbard and L. W. Harrison, B.M.J. ii./13,1341.

Mercury possibly assists by promoting absorption of the small cell exudation which occurs in syphilis.—T. W. Gibbard, B.M.J. ii./12,955.

Royal Naval Hospital, Chatham, Results. 1,100 cases of syphilis treated by Salvarsan and Neosalvarsan and 2,500 injections. Of the cases receiving one injection 12·5% relapsed, and after two or more injections only 1·3%. In primary cases with negative Wassermann give at least two injections at 10 to 14 days interval or as soon as Arsenic is out of the urine by Marsh's test. Start three months' course of Mercury at the same time. In primary cases with + reaction, and in the secondary stage of less than a year's standing, three injections with one month's interval. For other cases see paper.—G. B. Scott, R.N., B.M.J. ii./13,1344.

In primary cases results with Arsenobenzol combined with Mercury better than those obtained before discovery of '606.' In the secondary period recurrences are just as frequent in patients treated with Arsenobenzol as in those treated without.—B.M.J.E. ii./13,4.

Two years experience with Salvarsan at the Seamen's Hospital, Greenwich. 350 injections of Salvarsan and 150 with Neosalvarsan. Amongst the males 6·2% were primary, 57·7% were secondary and 21·1 were tertiary (including parasyphilitic). Amongst females 0·8% were primary, 12·1% secondary and 2·1% tertiary (including parasyphilitic). The injections were invariably intravenous. A sharp needle essential to puncture the vein. Recommended to use freshly distilled water and autoclave it immediately for use. Reaction is less. It is also desirable to purge the patient the night before injection and withhold food to avert reaction symptoms—headache, diarrhœa and vomiting. In the majority of cases the number of injections did not exceed two of 0·6 Gm. The conclusion is that Salvarsan is preferred and that prudence dictates that in *every case the remedy should be supplemented by a course of Mercury.*—Sir Henry Morris and H. MacCormac, L. ii./13,1243.

The combined Arsenic and Mercurial treatment of Neisser is recommended. This consists in periodic intravenous injections of Salvarsan followed by a course of five intramuscular injections of Grey Oil or 30 inunctions.—**Venereal Diseases Roy. Com. Report.** B.M.J. i./16,346,380,Editorial 385.

200 cases of primary and secondary syphilis under Salvarsan intravenously and mercury intramuscularly.

War Office Method (Letter, May 18/16, No. 24/General/4912, A.M.D. 2) employed, viz. :—

Course A.—During 52 days,

1st week 2 doses Salvarsan (0·3 Gm.) and 1 dose of Mercury.
2nd ,, 1 dose Salvarsan (0·3 Gm.) ,, 1 ,, of Mercury.
3rd ,, 1 ,, Mercury (only).
4th ,, 1 ,, Salvarsan (0·4 Gm.) ,, 1 ,, of Mercury.
5th ,, 1 ,, Salvarsan (0·5 Gm.) ,, 1 ,, of Mercury.
6th ,, 1 ,, Salvarsan (0·5 Gm.) ,, 1 ,, of Mercury.
7th ,, 1 ,, Salvarsan (0·5 Gm.) ,, 2 doses of Mercury.

If the Wassermann Reaction is still positive—

Course B.—14 days on Potassium Iodide in 10 grain doses.

If still positive—

Course C.—Comprised of 11th to 13th week.—3 doses of Mercury; 1·2 Gm. of Salvarsan during 15 days.

Various kinds of mild and severe reactions are described. The main point brought out is that patients should be persuaded to continue treatment until all clinical signs have disappeared and blood reaction is negative. Primary sores, secondary rashes and condylomata disappear quickly, but in cases in which the mucous membrane of the mouth and tonsil are affected, nor in glossitis the effect is not so speedy.—Maj. Lloyd Jones & Capt. A. J. Gibson, B.M.J. i./17,152.

As a routine treatment for primary and secondary syphilis three injections of 0·6 Gm. in 200 Cc. Saline at fortnightly intervals with two weekly injections of mercurial cream in the intervals. This course is an intensive one designed to render a soldier fit for active service quickly. Kharsivan found to be every bit as potent as the original German preparation. Record of 600 injections.—H. C. Lucey, B.M.J. i./16,614.

Reinfection with syphilis, 28 cases. Treatment with Salvarsan and Mercury. Perhaps the only persons immune from syphilis are the syphilitics.—C. F. White, B.M.J. ii./17,509.

The necessity of associating intravenous injections of Arsenic with Mercurial treatment has been confirmed by the French Military Medical Service on the results of 95.000 injections of Arsenical compounds during the first two years of the war. There was no fatal case and few serious results.—P. Ravaut, Arch. Med. et de Pharm. Militaire, Nov. 1916.

Method of giving Arsenobenzol and Mercury until Wassermann Reaction negative.—B.M.J. i./18,482.

Local Anæsthetics.

Novocain injection—2 Cc. of 1% Solution has been advised before, and is said to render the injections painless. Ethyl chloride has also been used. Also Morphine in dose of 0·01 Gm. where pain is excessive with subcutaneous injections.

Injectio Salvarsan cum Novocain (Intramuscular).

Dose.—Salvarsan 0·3, Novocain 0·03, Normal Saline to 10 Cc.

This has been employed, but the pain caused may persist after the anæsthetic effect has passed off.—W. H. M

Local Use.

For condylomata a powder containing Arsenobenzol as also a 50% Ointment strongly caustic when used in this manner and hence curative

For milder effect a 10% Ointment in a mixture of equal parts Soft Paraffin and Lanolin is used.

Salvarsan in glossitis.—Swabbing with solution of 0·1 Gm. in water 30 minims and Glycerin ½ ounce was curative. At the end of a week ulcers diminished to quarter of original size.—A. Allport, B.M.J. ii./12,349.

Ordinary ulcers heal rapidly by local use of Salvarsan and Neosalvarsan as dusting powder.—H. Alston, B.M.J ii./12,1748.

Injection of Patient's Serum removed after Salvarsan Treatment.

TRANSMISSION OF *Sp. Pallida* FROM THE BRAINS OF GENERAL PARALYTICS TO THE RABBIT AND THE EXPERIMENTAL PRODUCTION OF SYPHILITIC ENCEPHALITIS IN THIS ANIMAL (NOGUCHI'S EXPERIMENTS).

Noguchi inoculated the testicles of 36 rabbits with emulsions of six different specimens of brains of general paralytics in the fresh state. At the end of 97 days in one case and 102 days in the other a small but typical induration of the testicle and scrotal skin occurred—each containing Spirochætes. The development was slow as compared with transmission by infection made with material obtained from a chancre or secondary lesion—in the latter lesions generally appear after four to six weeks. The specific organism that produces general paralysis may be either a form which has been modified by the widespread use of Mercury or modified by passing through the bodies of individuals who have acquired resistance (a number of instances have occurred pointing to a specific organism).

This work led to the method of INTRATHECAL INJECTION OF PATIENT'S SERUM after SALVARSAN TREATMENT. After intramuscular injection of Salvarsan and Mercury and intravenous injection of Neosalvarsan,—a case of gummatous meningo-encephalitis greatly improved, but improvement occurred in particular after an intrathecal injection of serum taken one hour after a further dose of Neosalvarsan—the action being evidently due to antibody formation (the Serum contained no Arsenic) and not to Arsenic —F. W. Mott, L. ii /13,1367 : B.M.J. ii./13,1269.

Swift's method of injecting the curative material (antibodies circulating in the blood) one hour after an injection. The blood is withdrawn, allowed to clot and the serum collected after heating to 60° C. to destroy complement (?), diluted with Normal Saline and injected into the spinal canal. Emery says, it is not antibody effect, but the effect of minute amounts of Salvarsan. Results striking.—L. i./14,230. See also M.P.C. i./14,401, and C. A. Ballance, L. i./14,1525,1550.

Intraspinal treatment of syphilis of the central nervous system (8 cases). Doses of 0·6 Gm. Salvarsan intravenously with subsequently the autosalvarsanised serum withdrawn 20 minutes after the Salvarsan and reinjected 8 hours or the day after. Results favourable.—A. Rocke Robertson, B.M.J. ii./16,483.

LYMPH OF ARSENIC EATERS (*e.g.* Styrians) suggested to treat syphilis by injection. Negatived on grounds *inter alia* that the blood of these people is not necessarily rich in Arsenic. Further, any arsenic that is absorbed from the stomach and intestine is excreted in the urine.—B.M.J. ii./16,748.

After-Effects.

In previous editions we have dealt fully with sequelæ. As these are now generally known and bad subsequent effects are now comparatively infrequent, it will be sufficient to summarise what may be looked for :—

Headache. Numbness of the limbs Sickness.

Skin eruptions—urticaria and erythema.

Effects on the eye : iritis. (A person with unsound eyes must not receive the injection).

Rise in temperature follows the intravenous method.

Sensory nerve complications. Defects in hearing have been reported.

With a British made Arsenobenzol in 600 cases, headache occurred in 17%. rigor 5%, vomiting in 7%, diarrhœa 10%, transient albuminuria 0·3%, Herxheimer's Reaction 2·3%, herpes labialis in 1 case, thrombosis 0·5%. dermatitis in 1 case.—H. C. Lucey, B.M.J. i./16, 614.

Arsenic retention (especially with the intramuscular method) has resulted in death—*vide Vol. II.*

Two fatal cases of icterus gravis following Novarsenobillon.—B.M.J. i./18,448.

Jaundice occurs after arsenic compounds in syphilis. 115 cases in 7,000 patients.—Col. Bolam, B.M.J. i./19,489.

Recurrence.—The possibility of recurrence is now generally recognised and is met by the combined use of mercury and the remedy.—*Vide antea.*

Salvarsan, Mercury, Potassium Iodide and other drugs cannot with certainty destroy *Sp. pallida.*—H. C. French, L. ii./12,228.

Warnings and Contra-indications.

Idiosyncrasy to Arsenic in general may exist in the patient. It may be desirable to try a cuti-reaction with an arsenical solution, *e.g.* a solution of 0·3 Gm. Arsacetin in 3 Cc. of water, or with the compound itself in advance. Patients giving a positive reaction should not receive the injection.

If the injection be given on a full stomach or when blood pressure is high an alarming condition of feeble rapid pulse and collapse may supervene, which, however, usually passes off when vomiting occurs. A good purging night before and morning of the injection is advisable and no food or drink for some four hours before the infusion.—H. W. Bayly.—L. i./11, 153.

It is certain the drug can cause death. It is very unwise to inject a total of 1·2 *Gm.* (2 doses of 0·6 Gm.) within three days—a wider interval is important. Selection of case probably essential in the future.—L. i./12, 592.

The drug should not be given where there is a general exhaustion of vitality following the severity of the syphilitic poisoning, especially in persons already suffering from chronic organic diseases of the kidneys* and from chronic degenerations of the cardiac muscle, patients with definite atheroma of the arterial coats, such as have already suffered from anginal attacks or from signs of cerebral hæmorrhage, add to these, patients with diabetes, tabes dorsalis and general paretics, and lastly any case in which there is or has been recent endocarditis. Extreme caution is necessary in cases with signs of active pulmonary phthisis owing to the congestive action of the drug.—B.M.J.E. ii./13,7.

Substitutes for Salvarsan may be chemically identical, but clinically they differ remarkably. Local effects on veins more irritating.

An acute generalised and universal dermatitis followed the use of a substitute for Neosalvarsan, then most extensive desquamation —large flakes of epidermis could be removed from the bed sheets in handfuls. Severe purulent conjunctivitis and intense photophobia, eyelashes and hair shed. Recovery after 12 weeks. Similar results from a dose of Salvarsan substitute.—J. E. Lane, L. i./15,725. Two further cases, *ibid* 934.

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* According to some authors, nephritis is *not* a contra-indication.

Salvarsan and the new substitutes are more toxic and at the same time more efficacious than the Neosalvarsan. Not in agreement with previous writer.—D. Watson, L. i./15,935.

One of Mr. Lane's cases terminated fatally. He puts it as follows:—A healthy young man contracts syphilis. He is given 2 intravenous injections of an Arsenobenzol substitute. He develops symptoms of arsenical poisoning, from which he dies one month later, and as to the diagnosis of the death there can unfortunately be no mistake. This surgeon has the experience of having given some thousands of injections of the original preparation without untoward symptoms.—L. i./15,990.

Seventy-eight cases with British and French preparation with success.—C. Gibbs & M. Rawlins, L. i./15,991.

D'Este Emery and J. Everidge have given 1,400 doses. No symptoms of arsenic poisoning.—L. ii./16,804.

Acute angio-neurotic œdema due to a dose of British made Arsenobenzol; also a similar case with Salvarsan.—R. F. G. Parnell, W. C. P. White & P. Fildes, L. ii./17,866.

Wassermann's Reaction, Effect on. See Vol. II.

See also 'Specific Nature of Treatment,' p. 195.

For Details of examination of Blood for spirochetes and a note on 'What happens to the Spirochetes,' see also Vol. II.

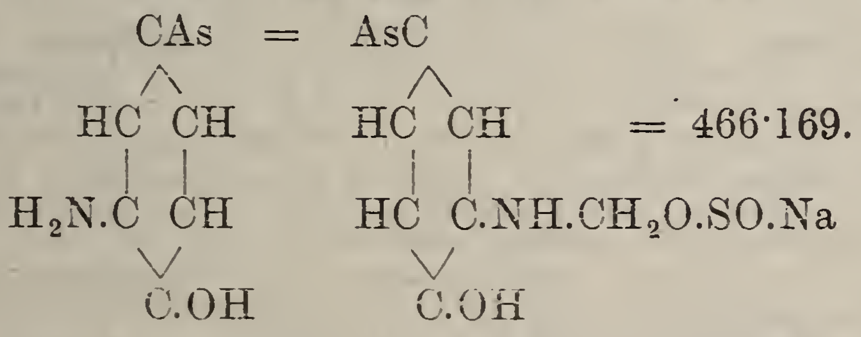
FURTHER REFERENCES.

"Salvarsan" by M. & W., provides abstracts of the literature of the subject ranging from March 15th to December 17th, 1910. These constitute practically everything of importance that was written on the subject up to that date. In the 15th edition of the "Extra Pharmacopœia" (pp. 194 to 197) we provided a further set of references dealing with the matter up to July, 1912, and the last Edition (pp. 187–189), provides abstracts up to 1915. It appears desirable to remove these as far as possible from this edition.

Streptococci in serum are killed by Salvarsan and Neo-Salvarsan in high dilution.—Sir A. E. Wright, L. ii./15,1012.

Salvarsan Sodium ('1026A' Ehrlich). Dose 0·3 to 0·45 Gm. As much as 1 Gm. has been given. A yellow powder readily soluble in water (requires no alkali to dissolve it).—B.M.J. i./15, 979.

P1 **Novarsenobenzol.** *Syn.* NEO-ARSENPHENOLAMINE, ✱NEO-KHARSIVAN (T.M. 364607), ✱**Neosalvarsan*** (No. 914 of Ehrlich's Series), ✱NOVARSENOBILLON (T.M. 368759), NOVARSENOL, ARSENOBENZOL ACID SODIUM FORMALDEHYDE-SULPHOXYLATE, SODIUM DIOXYDIAMIDO-ARSENOBENZENE-MONO-METHANE SULPHONATE.



Brit. Patent No. 7865/12. Aqueous Solutions of Salvarsan and Formaldehyde Sulphoxylate give a precipitate which is soluble in a minute quantity of alkali to form an almost Neutral Solution. The product differs according to temperature employed. At ordinary temperature the precipitate contains

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*Trade Mark No. 340337 suspended in favour of British Houses *c.f.* Arsenobenzol.

one "Sulphur-Acid" group, at 60–70° it contains two "Sulphur-Acid" groups. See also Patent No. 8219/12. Licences to use these patents have been granted. See Arsenobenzol.

Dose—

Average single dose for men 0·6 to 0·9 Gm. (=0·4 to 0·6 of Arsenobenzol).

For women 0·45 to 0·75 Gm. (=0·3 to 0·5 of Arsenobenzol).

For children, according to age, 0·15 to 0·3 Gm. (=0·1 to 0·2 of Arsenobenzol).

For infants 0·05 Gm. (=0·03 of Arsenobenzol).

Speaking generally, the dosage for this compound is identical with that of Arsenobenzol and for guide as to repetition of dose and course of treatment, the remarks under that heading apply here also.

A yellow powder readily *soluble* in water with neutral reaction.

Strength in comparison with Arsenobenzol.—It is 2/3 the strength.

Arsenic Content.—21·1% approx.

Method of Injection.—Intravenously or intramuscularly, not subcutaneously. For Intravenous Solution dissolve in proportion of 0·9 Gm. Novarsenobenzol in 150 Cc. of fresh Distilled Water (or 0·4% Saline in preference).

According to Ravaut, Duhot, Emery, Strauss and Stern, CONCENTRATED SOLUTIONS can also be injected intravenously, *e.g.*, 0·45 to 0·6 Gm. in 10 Cc. sterile distilled water, or 0·75 to 0·9 Gm. in 15 Cc., thus the so called "water-faults" are almost eliminated.—See abstract *infra*. Ravaut in fact stipulates that whatever the quantity of the neo-compound 10 *Cc. at most of water is to be used.*

Slight febrile reaction generally occurs after the first injection. If this reaction reappears in course of treatment (*i.e.*, on subsequent injections) it is a sign of intolerance. At least 8 days must elapse between two consecutive injections—the first dose being a small one.

Intramuscular Injection. Employ 0·6 Gm. Novarsenobenzol in about 12 Cc. *of distilled water* (approx. isotonic). Precede with 5 Cc. of ½% Novocain Solution.

The temperature of Solutions should not exceed 20 to 22° C.

Uses.—As for Arsenobenzol. It is said to be better tolerated.

Contraindicated in meningitis and otherwise as for Arsenobenzol.

References.

General Description —J. M'Intosh, P. Fildes and H. B. Parker reported on its use—discarded intramuscular injections in favour of intravenous. The *dosis max. tolerata* for rabbits is 0·18 Gm.—slightly larger than for Salvarsan. Experiments on destructive power *in vitro* on trypanosomes.—L. ii./12,82.

A suspension in Glycerin has been used for injection with a few drops of 1% Beta-eucaine Solution. This is almost painless; that made with distilled water is very painful.—A. L. Wolbast, Med. Rec., July 27, 1912.

Large doses have been given. 1·2 Gm. every eight days for a month without ill effect, but this amount is warned against.—Brevet Lieut.-Col. T. W. Gibbard and Maj. L. W. Harrison.—B.M.J. ii./12,954.

Experience with Neosalvarsan and Salvarsan at the Seamen's Hospital. The Compound may be dissolved in water or 0·4% Saline Solution for intravenous use. The water must be cold and the Solution used at once.—Sir Henry Morris and H. MacCormac.—L. ii./13,1243.

For an exhaustive abstract of the last communication see Combined Salvarsan and Mercury.

Suggestion to use the Neo-and Arsenobenzol Solutions *concentrated*, from 1 to 6% being used, with advantages claimed—reactions diminished, shorter time of injection, elimination slower. Concentrated Novarsenobenzol Solutions can be given intravenously, but not the Salvarsan.—B.M.J. ii./13,1505.

Rat-bite fever, a case of in India, treated by 0·7 Gm. of Neosalvarsan, subsequently by Metharsinate of Soda *per os.* Hata mentions 8 cases. Treatment in other cases—Methylene Blue, Quinine, Arsenic, Mercury and Salol dissolved in Olive Oil for the roseolar eruption.—L. ii./13,1764.

In general paralysis marked cerebral improvement from small intravenous injections.—B.M.J.E. ii./13,40.

Typhus fever treated intravenously. In two cases the course of the disease was aborted.—Glas. Med. Jl., Nov. 1913,376.

Tuberculosis treated with, L. i./14,1602.

Blood pressure is generally lowered by Neosalvarsan intravenously; it is certainly not increased.—H. D. Rolleston, B.M.J. ii./15,281.

Neo-Salvarsan or Novarsenobillon *subcutaneously* influences syphilitic lesions *more rapidly than intravenous doses of* Salvarsan or Arsenobillon. Experience of 1,500 subcutaneous or intramuscular injections of Neo-Salvarsan. Numerous methods were tried and are described, the best being to dissolve the Neo- (0·6 Gm.) in 1 Cc. of a 4% Stovaine solution and make up to 2 Cc. with a **Creo-Camph Cream** melting at 15° C. which is stated to be a 'special' formula. **Campho-Phenique** instead of Creo-Camph. also used with encouraging result. Morphine ⅓ grain is required to overcome pain. The injection is made about a point three finger breadths below the crest of the ileum on a line joining the tuber ischii with a point on the crest of the ileum which is perpendicularly above the great trochanter when the patient is upright—L. W. Harrison, C. F. White and C. H. Mills.—B.M.J. i./17,569.

Novarsenobillon ('914') in syphilis of the central nervous system safe and most efficient.—H. Carlill, L. i./18,243.

Novarsenol intravenously in syphilis. Course of 6.15 Gm. spread over 80 days with Mercurial Cream in addition.—H. W. Abbot, L i./18,307.

Severe dermatitis from Novarsenobillon.—L. G. Leonard, B.M.J. ii./19,773.

*GLUCARSENOL (T.M. 373252).—A solution of Novarsenobenzol in Glucose with Stovaine and Guaiacol for intramuscular injection. The Glucose is thought to render the absorption of Arsenobenzol more certain—though slower. The analgesics are added to assist. Glucose to some extent protects against oxidation.—L. ii./18,96.

Guaiacol 1, Liquid Glucose 50, Water recently sterilised to 100 is a useful solvent for Novarsenobillon—even 0·75 Gm. will dissolve in 10 to 20 minims. Painless for intramuscular injection into the buttock.—T. Anwyl-Davies, L. ii./18,757.

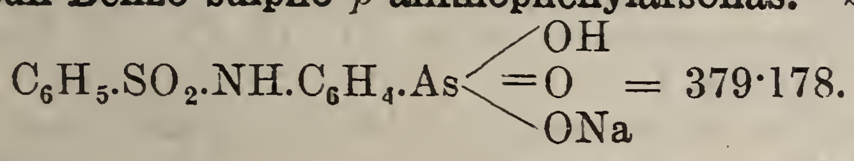
P1 ***Luargol** (T.M. 373252). *Syn.* DANYSZ "102." *Dose.*—0·10 or 0.15 Gm. intravenously repeated, with a total of 1·2 or 1.5 Gm. An arsenobenzol reinforced with silver and antimony.

Has given rise to indurations of the veins of the arm in consequence of too high content of soda in the solvent.—P. Ravaut, Arch. Med. et de Pharm. Militaire, Nov. 1916. See also J. E. Lane, L. i./16.623 and L. i./17,274.

P1 **Di-Sodo-Luargol** given in doses of 0·05 to 0·2 Gm. in 10 Cc. of Distilled Water intravenously. Benign tertian malaria well treated.—L. Hamilton & L. Rawlins, L. i./18,503.

P1 **Salvarsan Copper**—a new combination.
Dose.—0·1 Gm. In frambœsia and malaria.—B.M.J.E. ii./14,12.

P1 **Sodii Benzo-sulpho-*p*-aminophenylarsonas.** *Syn.* HECTINE.



$$C_6H_5.SO_2.NH.C_6H_4.As\begin{cases}OH\\=O\\ONa\end{cases} = 379\cdot178.$$

Dose.—

Ampoules 'A' contain 0·1 Gm. in 1 Cc.—for 15 to 30 daily intragluteal injections. Ampoules 'B' contain 0·2 Gm. in 1 Cc. for more advanced cases. **Pills** contain 0·1 Gm. One or two daily for 10 days. **Drops.**—20 drops contain 0·05 Gm. *Dose.*—20 drops a day, during the first 4 days; 40 to 100 drops daily, during the following 10 days.

Colourless needles containing 19·75% Arsenic approximately. Very soluble in water. Solutions can be sterilised without decomposing.

Syphilis is a purely local infection during the 42 days of incubation. A thorough local treatment ought, therefore, to nip it in the bud. Daily injections of 0·2 Gm. in one Cc. distilled water are made in the neighbourhood of the chancre for 30 days. The result is complete destruction of the organisms in the initial lesion. To reach those that may have got into the circulation, Hallopeau advocates 20 gluteal subcutaneous injections of mercury benzoate (2 Cc. of a 1% solution) in addition to the local treatment. The success of the author's method is, he says, invariable, and acquired syphilis can be aborted in 30 days. H. Hallopeau, Interstate Med. Jl., Jan., 1911, per Pres., see also Major French, R.A.M.C., L. ii./11,1385.

As much as 10 Gm. has been given spread over two months.—F. N., 1911.

Intractable syphilis treated by Hectine 10 subcutaneous injections of 0·2 Gm., the first three on alternate days followed by 7 daily. Improvement in weight.—E. G. French & C. H. Wills, L. i./15,1338

Petrini-Galatz gave 0·2 Gm. daily intramuscularly, the total amount being 3 to 4 Gm. and in one case 5 Gm. Lesions healed. No symptoms of intolerance. Good results in primary, secondary or tertiary and hereditary forms of syphilis. Less complicated than Salvarsan injections. Cases should finally receive Mercury and Iodide.—V. Dudumi, Coltzea Hospital, Bucharest.

P1 **Hectargyre.** A preparation described as a mercurial salt of Hectine, for treatment of syphilis. Stated to be more rapid than any other mercurial agent. P1 **Ampoules** 'A' contain Hectine 0·1 Gm., Mercury oxycyanide 0·01 Gm. in 1 Cc. 'B' contain Hectine 0·2 Gm., Mercury Oxycyanide 0·015 Gm. in 1 Cc.—one to be injected daily intramuscularly or intravenously, not subcutaneously. P1 **Pills** contain Hectine 0·1 Gm., Protoiodide of Mercury 0·01 Gm. and Opium Extract 0·01 Gm. *Dose.*—2 pills daily for 12 *to* 15 *days*, 10 to 15 comprising the course.

P1 **Kinectine.** A compound of Hectine with Quinine—*i.e.*, Benzo-sulphon-para-amino-phenyl-arsenate of Quinine. *Tablets* are made. Dose.—Three daily, one in the morning and two at night. *Use.*—As a prophylactic against and curative of hay fever, influenza and acute coryza.

P1 ***p*** **- Amino - phenylarsonic - Toluene - Sulphonate.** $C_6H_4CH_3(p)SO_2NH.C_6H_4AsO_3H_2$ is analogous with the acid of Hectine. Morgan and Mickelthwait made it by the Schotten and Baumann reaction by condensing *p*-Toluene Sulphone Chloride with Sodium Arsanilate. It should have properties analogous with Hectine.

P1 **✱Galyl.** (T.M. 362590). *Syn.* TETRAOXY-DIPHOSPHAMINO-DIARSENOBENZENE. $C_{24}H_{22}O_8N_4P_2As_4$. =856·256. It is now also issued as a Sodium Salt for intramuscular use in a weak solution of glucose—2 Cc. ampoules, containing 0·15 Gm. Galyl. This replaces the *oily* solution previously used.—L. ii./17,409.

Dose.—4 grains (**0·25 Gm.**) to 6 grains (**0.4 Gm.**) The usual dose is 0·2 to 0·25 Gm. intravenously every 6 or 8 days, of these 6 to 7 injections within 30 to 45 days, with a total of 1·4 to 1·6 Gm.

Intravenously.—"Concentrated" either in 10 Cc. of Distilled Water or "Dilute" in 100 Cc.

An Oily Emulsion for *Intramuscular* injection is also made containing 0·3 and 0·4 Gm. per ampoule.

Yellowish powder *soluble* readily in water on addition of Sodium Carbonate. Contains 35·3% Arsenium ('606' contains 31·6%), and 7·2% Phosphorus. Sterilisable and does not coagulate albumin.

Three injections at intervals of eight days sufficient. Marked effects in syphilis—chancres healed in 2 to 12 days. Has a powerful action also on trypanosomes.

This body and Ludyl (*infra*) are supplied in 'Self-Ampoules' and are injected with a needle of somewhat wide lumen into the muscle in the lumbar region. Three Ampoules are usually sufficient to reduce the syphilitic manifestation. Rise in temperature, diarrhœa, and occasionally vomiting may be expected.

Contraindications.—Heart and liver affections, presence of albumin in the urine.—B.M.J.E. ii./13,72.

Syphilis treated with Galyl, good results.—B.M.J. ii./14,470, 583.

The recent *Royal Commission on Venereal Diseases* reported favourably on its use.

Subtertian cerebral malaria treated by Galyl and Quinine intravenously, *v.* p. 674.

Cancrum oris in a child of 3 treated by Galyl, 0·06 Gm. intravenously repeated intramuscularly—after surgical treatment.—B. A. Peters, B.M.J. i./16,719.

Use at Royal Naval Hospital, comparisons with Neosalvarsan. Good results.—S. F. Dudley, L. ii./16,59.

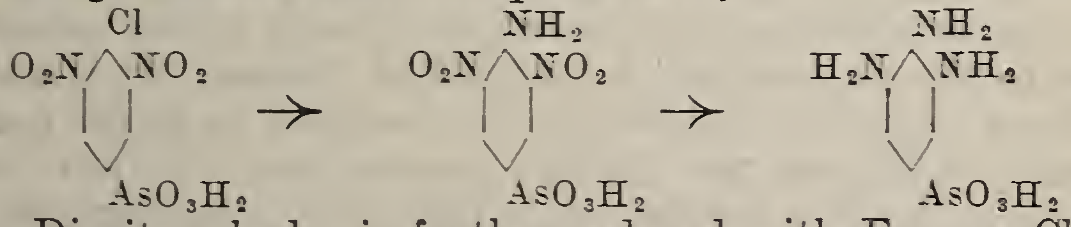
1000 intravenous injections. No fatality has yet occurred with Galyl. Urticaria and erythema have, however, been seen.—H. Spence, L. ii./15,1292.

Nine cases treated intravenously 0·3 to 0·4 Gm.—no ill effects. 0·5 Gm. produced disturbance of the pulse and heart.—A. Foerster, L. ii./15,645.

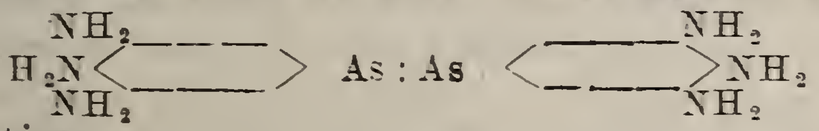
$\boxed{\text{P1}}$ ✱**Ludyl** (T.M. 362593). *Syn.* PHENYL-DISULPHAMINO-TETRA-OXY-DIAMINO-DIARSENO-BENZENE is similarly employed to the above.

Salvarsan and other derivatives of Arsenobenzene possess the singular property, as announced by Ehrlich at the International Medical Congress 1913, of coupling with the salts of Copper, Silver, Gold and the metals of the Platinum group in a way that the ordinary analytical properties of these metals are not shewn in the resulting combinations which can be intravenously injected just like Salvarsan itself. This reinforces the germicidal action—Luargol is an example. —G. T. Morgan.

Poly-amino-arsenobenzenes, notably **Hexamino-arsenobenzene** and **Triamino-phenylarsinic Acid** are further recent developments. Nitrated *para*-Chlorophenylarsinic acids are converted into the corresponding amino-dinitro compounds, *e.g.*



and the Di-nitro body is further reduced with Ferrous Chloride in alkaline solution. This tri-amino acid and its generator the dinitro-compound are both reducible to Hexamino-arsenobenzene



by acid reduction.

Both the Triamino Acid and the Hexamino base are comparatively slightly toxic, and the latter has powerful spirillocidal action. For further recent research on these and allied bodies and details of numerous patents, notably regarding a partly methylated hexamino-arseno-benzene derivative (Karrer & Giemsa's) with the property of dissolving in soluble bicarbonate to form a soluble stable **Carbonate** consult G. T. Morgan's Organic Arsenic and Antimony Compounds, 1918.

1 : 3 **Benzo-diazole Arsinic Acids** and their reduction products have recently been prepared and studied by R. R. Baxter and R. G. Fargher, C.D., '19,1317.

For a Table showing Formula, Arsenic Content and Solubility of most of the Arsenic Compounds dealt with in the preceding pages, see Vol. II.

W. H. Martindale communicated a comprehensive paper on Organic Arsenic Compounds to the International Congress of Applied Chemistry, 1909, and introduced several compounds which at that time had not been used therapeutically. Prof. A. D. Waller, of the Physiol. Lab., London University, examined several of these for their physiological effect—the conclusions are given in *Vol. II*

P1 ATROPINA. Fr. Cx.

$C_{17}H_{23}NO_3=289·279$.

P1 "*Atropine and its Salts and their preparations.*"—See Note to Guttæ Atropinæ Sulphatis.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), increased to $\frac{1}{16}$, or in acute mania to $\frac{1}{8}$ grain or more. Fr. Cx.—*Maximum dose* in 24 hours 0·001 Gm. ($\frac{1}{64}$ grain) approx.—is generally given internally as sulphate.

An alkaloid obtained from *Atropa Belladonna*, and other solanaceous plants. It is generally in white acicular prismatic crystals, alkaline in reaction.

Soluble.—1 in 500 of water, 1 in 3 of 90% alcohol, 1 in 36 of ether (Fr. Cx. 1 in 25), 1 in 1 of chloroform, 1 in 40 of olive oil, freely soluble in glycerin and oleic acid. Melts (*Off.*) at 114·5° to 115·5° C. Presence of hyoscyamine lowers M. pt.

Incompatible with caustic alkalis and mercurial salts.

The mydriatic alkaloids, Atropine and Hyoscyamine may be manufactured from *Atropa Belladonna, Datura Stramonium, Duboisia myoporoides* and *Hyoscyamus niger*, and Hyoscine may be obtained from the last two plants. Atropine does not exist as such to any great extent in these plants, but is produced from the Hyoscyamine (its isomer) by the action of Alkali which is used in the manufacture.

Prior to the war derived from Central Europe. It is now being made from Egyptian Henbane in this country in larger quantities. The use of this plant now tends to render the cultivation of other Solanaceous drugs a matter of indifference. The amount of the Egyptian available is very considerable.—F. A. Hocking, C.D. Mar. 10/17.

By the action of baryta water both Atropine and Hyoscyamine split up into Tropic Acid and Tropine : it is, in fact, **Tropine Tropate.**

Atropine is to all intents an intimate mechanical mixture of *d.*-and *l.* hyoscyamines which differ in physiological effect. The purest Atropine contains these two constituents in almost precisely equal quantities. This is not the case in the solanaceous alkaloids. Cushny showed that 0·045 mgr.

l.-Hyoscyamine had the same optic effect as 0·55 mgr. of *d.*-Hyoscyamine, hence the variety *l.* has 12 times the strength of the latter. A sample of Egyptian Henbane (*H. muticus*) yielded at least 83% of its alkaloids as *l.*-Hyoscyamine. 0·5% solutions of this are equal to 2% solutions of Atropine or ophthalmic purposes.—H. R. Jensen, L. ii./16,797.

Tropine may also be combined with other acids such as salicylic or mandelic acid to form salts. These salts when treated with diluted hydrochloric acid form a class of artificial alkaloids, to which the generic name of *tropeines* is given. One of these made from the mandelate of tropine is **Homatropine** or oxytoluyltropeine (*q.v.*)

Antidotes.—Stomach pump and emetics followed by stimulants, hot coffee, morphine hypodermically $\frac{1}{3}$ grain every two hours or pilocarpine nitrate $\frac{1}{2}$ grain, hypodermically. Electricity, heat, and artificial respiration.

Pharmacological antagonism between Atropine and Pilocarpine appears to depend on mass action rather than upon actual amounts injected into the animals.—A. R. Cushny, Jl. Ph. Exp. Therap., 1915, *6*, p. 439.

Uses.—Atropine and its salts are used for ophthalmic purposes to dilate the pupil and paralyse accommodation.

Given internally or hypodermically, they are antagonistic to opium and morphine, Calabar bean and physostigmine, jaborandi and pilocarpine, aconite and aconitine, bromal, and hydrocyanic acid. Physiologically, whilst Atropine acts as a "stimulant" to a large part of the central nervous system, it paralyses many of the nerves. It lessens the perspiration, especially the night sweats of phthisis, and has been thought to stop the flow of milk and saliva, most of the secretions, but not the amount of the urine.

(There are, however, according to Dixon, B.M.J. ii./09,540, no nerves the excitation of which causes a secretion of milk—an ordinary plaster acts as well as one of Belladonna in suppressing milk secretion, *c.f.* also Emplastrum Belladonnæ.)

It is also injected to relieve pain in sciatica and is given to check bed wetting, and to relieve spasm of pain of urinary calculus, cystitis, and prostatitis. Relieves bronchial spasm, whooping cough and asthma.

Hypodermically prior to chloroform it is of value as an antidote to the cardio-inhibitory effects of the anæsthetic.

Typhoid Diagnostic, vide, Vol. II.

Gas Poisoning.—Atropine in treatment of those suffering from effects of Chlorine and Bromine and other gases. Animal experiments (rabbits) showed that doses by injection of 2·5 mgr. to 4 mgr. were most satisfactory. In conjunction with Oxygen the effects were specially good. Examinations of the animals treated with Atropine were particularly instructive, all the lungs being normally collapsed. Without Atropine, Oxygen inhalation produces little amelioration of the symptoms.—D. V. Cow, L. i./15,1147. See also Dixon and Ransom, Jl. Physiol. 1912.

Its administration tends to cure inebriety.—Owen Lankester, B.M.J. ii./05,106.

McBride's hypodermic injection treatment for inebriety :—

First week,	Atropine	$\frac{1}{100}$	grain,	with	Strychnine	$\frac{1}{60}$	grain	*t i.d.*
Second ,,	,,	$\frac{1}{60}$	,,	,,	,,	$\frac{1}{30}$	,,	,,
Third ,,	,,	$\frac{1}{50}$	,,	,,	,,	$\frac{1}{30}$	,,	,,
Fourth ,,	,,	$\frac{1}{100}$	,	*sine* Strychnina.				

together with a mixture of Cinchona Extract, Sal Volatile, and Spirit of Chloroform thrice daily. A little Capsicum may also be added.

Ⓟ Mistura Antidipsomania Form No. 2:

Dose.—$\frac{1}{2}$ ounce (**15 Cc.**).

Concentrated Liquors of Commerce of Cinchona and Gentian 10 minims, of Capsicum $\frac{1}{2}$ minim, Solution of Strychnine Nitrate (4 grains to the ounce) 1 minim, of Atropine Sulphate (1 grain to the ounce) 1 minim, Glycerin 1 drachm, Water to $\frac{1}{2}$ ounce, has been found of great value with the Strychnine and Atropine injections, gradually diminished in strength.

In the knowledge of the writers Liquor Strychninæ and Liquor Atropinæ Sulphatis up to 8 minims respectively internally and then gradually reducing, together with a cinchonine tonic worked wonders.

Three alcoholics treated by the method—general health improved, but craving for alcohol remained. Dryness of the mouth caused by the Atropine objected to.—B.M.J. i./09,1007; L. i. /09,1114.

For further Inebriety Treatment see p. 119.

References to use of Atropine and its Salts.

In acute mania causes sleep in dose of $\frac{1}{4}$ to 1 grain of sulphate.—R.

Sea-sickness. It has been suggested to treat by paralysing the accommodation of one eye only with one drop of atropine solution, 4 grains to the ounce daily.—B.M.J. i./05,1090. Injection of somewhat large doses, $\frac{1}{64}$ grain for males and $\frac{1}{85}$ grain for females, relieves sea sickness.—L. i./14,49.

Iritis is to be treated locally by dilating the pupil and keeping it dilated. Henderson uses Atropine 1% with Cocaine 0·5% Ointment for the first three days every four hours. Then the Cocaine is eliminated, Atropine being used alone three or four times a day. Hot fomentations and leeches to temple beneficial.—B.M.J. i./09,1221.

Never use Atropine in elderly people without good reason, and watch the tension all the time during use.—M.P. May 1, '07,474.

Cholera successfully treated by hypodermic injection of Atropine.—L. i./93,1443. Originally advised by Sir L. Brunton to lessen vomiting. $\frac{1}{100}$ grain doses tried morning and evening. Results of value.—Sir L. Rogers, L. ii./15,222.

Will abort a cold in dose of $\frac{1}{150}$ to $\frac{1}{50}$ grain (Sulphate), to be dissolved in a tumbler of water and the whole sipped in the course of an hour, to be repeated next day if necessary.

Hæmostatic action is obtainable from full doses of Atropine with development of toxic symptoms,—dry mouth, flushed face, and dilated pupil. Successful in active and passive arterial and capillary, traumatic and hæmophilic forms of bleeding.—Waugh, Med. Rec., Nov. 1909, per M.A. 1911, p. 20.

In pulmonary hæmorrhage in tuberculosis Atropine Sulphate $\frac{1}{100}$ grain hypodermically at intervals of 4 or 2 hours according to circumstances,—acts no doubt by lowering pressure in pulmonary vessels.—J. W. Allen, Glas. Med. Jl., Nov. 1913.

Cardiac depression in diphtheria treated by Atropine Sulphate $\frac{1}{100}$ grain, Strychnine Hydrochloride $\frac{1}{100}$ grain, Adrenalin Solution (1 in 1,000) 5 minims, Water to 10 minims, hypodermically every four hours.—B.M.J. i./12,535.

In tuberculosis Atropine in doses of $\frac{1}{100}$ to $\frac{1}{50}$ gr. at bedtime makes sweating impossible.—Dixon, Pr. xc., 1.

Epididymitis prevented by hypodermic or Suppository use (1/75 grain in each) of Atropine. Useful in treatment of gonorrhœa.—W. Harrison and C. H. Heald, from a Military Hospital Report.

Heart Block, Recent Work on.—In cases of high degree not due to organic causes, *Atropine* is often effective in reducing the block. Not successful in cases of complete organic block, nor does it appear to lessen either frequency or severity of the syncopal attack. Antisyphilitic treatment (Mercury, Potassium Iodide, Salvarsan) has been extensively tried in view of the fact that many cases of block are due to gumma of the bundle—results on the whole disappointing.—Pr. Nov. 12/655.

P1 **Atropinæ Salicylas** $C_{17}H_{23}NO_3.C_7H_6O_3 = 427{\cdot}362$

P1 **Atropinæ Valerianas** $(C_{17}H_{23}NO_3.C_5H_{10}O_2)_2H_2O = 800{\cdot}784$
Dose of either $\frac{1}{60}$ grain (**0·001 Gm.**).

White crystalline powders—the latter is used for neuralgia, neurasthenia and in asthma (minute doses).—Pres., Jan. 1911, p. 1.

P1 **Liquor Atropinæ Salicylatis.**—Atropine $\frac{1}{2}$ grain, Salicylic Acid $\frac{3}{4}$ grain, Water 1 ounce.

P1 **Atropinæ Sulphas** (*Off.*). P.G.V., P. Helv., P. Jap.
$(C_{17}H_{23}NO_3)_2H_2SO_4 = 676{\cdot}634$. P.G. and Fr. Cx. $+H_2O$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**) increased to $\frac{1}{16}$, or in cases of acute mania $\frac{1}{8}$ grain. Fr. Cx. has maximum dose in 24 hours $\frac{1}{32}$ grain approx.

Opaque white minute crystals or granules, soluble 1 in less than 1 of water.—W. H. M. Commercial samples melt mostly at 186° to 187° C. P. Jap. 180° C.

Uses.—See Atropine (base).

P1 **Tablets** $\frac{1}{100}$ grain (**0·0006 Gm.**).

Treatment of ulcus ventriculi by injections of $\frac{1}{64}$ grain thrice daily for some weeks caused hyperacidity to disappear or diminish. Gives rest to the stomach.—M. '08, 153.

Ptyalism is relieved by taking Atropine Sulphate $\frac{1}{300}$ grain in water every 4 hours.—Beddoes.

P1 **Granules de Sulphate d'Atropine.**—Fr. Cx. contain 1 mgr.

P1 **Compound Asthma Fluid** (**Martindale**).

This preparation is only supplied on a prescription by a qualified medical practitioner.

It contains, amongst other ingredients, a small proportion of atropine, and is found of considerable value in preventing attacks of asthma. A few "blows" from a fine spray will be found sufficient to ward off an attack. A special **Spray** is made for the fluid.

It is prepared in 3 strengths, designated 'A' 'B' and 'C' respectively. We find by experience that the 'A' strength is well tolerated by all sufferers, the 'B' being double strength of 'A' in Atropine is often more effectual. The 'C,' double strength of 'B,' is used by confirmed asthmatics and affords relief.

The use of atropine in asthma was first advocated by Trousseau. May effect permanent relief.—M.P. 1907, Oct. 30, p. 482.

P1 **Lamellæ Atropinæ, Discs of Atropine** (*Off.*).

Contain $\frac{1}{5000}$, also made with $\frac{1}{2000}$, and $\frac{1}{1000}$ grain of the sulphate in each, for dilating the pupil; others containing P1 $\frac{1}{500}$ (R.O.H.) and P1 $\frac{1}{250}$ grain paralyse the accommodation. Also prepared containing P1 Atropine Sulphate $\frac{1}{1000}$ grain combined with Cocaine Hydrochloride $\frac{1}{200}$ grain, and $\frac{1}{50}$ grain of each, and P1 Cocaine $\frac{1}{200}$ with Atropine $\frac{1}{5000}$. (R.O.H. has P1 Atropine $\frac{1}{200}$, Cocaine $\frac{1}{100}$ grain. P1 Atropine Sulphate $\frac{1}{5000}$ grain with $\frac{1}{500}$ grain of Morphine are also made).

P1 **Hypodermic Tablets** contain $\frac{1}{200}$, $\frac{1}{150}$, $\frac{1}{100}$, $\frac{1}{60}$, and $\frac{1}{50}$ grain in each, also $\frac{1}{120}$ grain combined with Morphine Sulphate $\frac{1}{2}$

grain, and Atropine Sulphate $\frac{1}{200}$ grain combined with Morphine Sulphate $\frac{1}{4}$ grain, *vide* also Morphine Sulphate.

P1 **Sterules, Hypodermic,** contain $\frac{1}{100}$ grain in 8 minims. This is the strength of P1 **Injectio Atropinæ Hypodermica, B.P.C.** *Dose.*—2 to 8 minims.

P1 **Liquor Atropinæ Sulphatis.** *Off.*
Dose.—$\frac{1}{2}$ to 1 minim (**0·03 to 0·06 Cc.**), or more.

Strength 1%. Should be directed to be freshly prepared.

P1 **Guttæ Atropinæ Sulphatis, R.O.H.,** $\frac{1}{4}$, $\frac{1}{2}$, 1, or 2%*.
St. Th. H. has 0·5 or 1%; U.C.H. 0·5 or 1%. St. M.'s H. 0·5%.

P1 **Guttæ Atropinæ cum Zinco, R.O.H.**—Atropine Sulphate 0·5 or 1, Zinc Sulphate 0·25, Sterilised Distilled Water to 100.

Chalk's Bottles with rubber cap on hollow stopper are convenient for eye drops and mostly employed. They are supplied in colourless and amber glass Metal cases, sterilisable for same, are durable, and suitable for travelling.

Ophthalmic Bottle, Lang's, is intended for ophthalmic solutions and ointments. It has no ledges on which dust can accumulate. The cap of the bottle when removed rests upon three points so as to pick up the minimum of dust. A small rod or pipette stands inside.—B.M.J. i./03,501.

Eye Rods have (i) pointed, (ii) flattened or (iii) bulbous ends (Lang's) for ointments or solutions.

P1 **Guttæ Atropinæ cum Cocaina, R.O.H.**
Atropine Sulphate 1, Cocaine Hydrochloride 2, Sterilised Distilled Water to 100. St. Th. H. has the same. St. M.'s H. Atropine Sulphate 0·5, Cocaine Hydrochloride 2·5, Water to 100.

P1 **Sterules, Ophthalmic, of Atropine Sulphate** Solution 1% are made; also of P1 **Atropine Sulphate** Solution $\frac{1}{2}$% with **Cocaine Hydrochloride** $2\frac{1}{2}$%.

P1 **Guttæ Atropinæ et Quininæ** (Liverpool Eye and Ear Infirmary). Atropine Sulphate 4 grains, Quinine Sulphate (bi-sulphate) 4 grains, Distilled Water 1 ounce.—B.M.J. i./04,452.

P1 **Glycerinum Atropinæ.** St. Th. H. has Atropine Sulphate $25\frac{1}{2}$ grains dissolved in Water 5 ounces, add Compound Tincture of Lavender 100 minims, and made up to 1 pint with Glycerin. This is more cleanly than Glycerinum Belladonnæ and does not stain. It replaces Glycerinum Belladonnæ. U.C.H. is similar.

The resinous matter in the Compound Tincture of Lavender deposits. We found the following to keep better: Atropine Sulphate $127\frac{1}{2}$ grains, Water 25 ounces, Spirit of Lavender 2 minims, Spirit of Rosemary 2 minims, Cinnamon Oil 1 minim, Magenta Solution *q.s.*, Alcohol 90% 1 ounce, Glycerin to 100 ounces.

P1 **Linimentum Atropinæ.**
Atropine 1 (more or less, if ordered), Oleic Acid 15, Castor Oil 15, Oil of Lavender 1, Alcohol (90%) *q.s.* to 100.

In lumbago and other rheumatic affections is very serviceable used with gentle friction; it is readily absorbed.

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* *A simple solution of Atropine is a preparation of Atropine, but a compound of several substances to which a small percentage of Atropine has been added, may more properly be regarded as a "preparation or admixture containing Atropine."*—Glyn Jones, p. but *v* 'Poisons.'

P1 **Oleum Atropinæ.**
Atropine 1, Castor Oil *q.s.* to 100. Heat to dissolve. Forms a stable solution, *vide* Alkaloidal Oils, under **Oleum Ricini.**

P1 **Pessaries of Atropine** are prepared (weight 120 grains) with gelatin mass or at times with oil of theobroma, containing generally $\frac{1}{20}$ grain of the alkaloid in each.

P1 C. H. W. has Vaginal Suppositories of Atropine Sulphate $\frac{1}{18}$ grain, Lead Iodide 10 grains, Theobroma Oil to 2 drachms.

P1 **Pilula Atropinæ,** $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{80}$, $\frac{1}{60}$ grain in each.
Taken at night, to check sweating. May cause dryness of the throat.

P1 **Pilula Atropinæ, Arsenici et Quininæ.**
Quinine Sulphate 150 grains, Arsenious Acid Trituration 10 grains, Atropine Sulphate Trituration 5 grains with Milk Sugar and Acacia *q.s.* to make 100 pills. For catarrhal cold, if taken in early stage, one every 3, 4, or 6 hours, "nips it in the bud."—Pr. xxxviii. 179.

P1 **Unguentum Atropinæ,** R.O.H., *Syn.* **Vaselinum Atropinæ.** Atropine 0·5, 1 or 2, Soft Paraffin 100; heat till dissolved. P1 **Unguentum Atropinæ cum Acido Borico,** R.O.H., has Atropine 1, Powdered Boric Acid 15, Soft Paraffin to 100; and P1 **Unguentum Atropinæ cum Cocaina,** R.O.H., has Atropine 1, Cocaine (alkaloid) 2, in Soft Paraffin 100. P1 **Unguentum Hydrargyri Oxidi Flavi cum Atropina,** R.O.H., has Yellow Mercuric Oxide 1, and Atropine 0·5, Soft Paraffin 100. P1 **Unguentum Iodoformi cum Atropina,** R.O.H., Iodoform 15, in place of the Mercuric Oxide in last preparation.

An Ointment made with Atropine base 1 in Soft Paraffin 99 crystallises out even before cooling.

Our experiments in 1911 showed that a **Neutral Oleate Formula** overcomes the difficulty *i.e.*, that wherever Atropine base is ordered in Eye Ointments the base should be finely powdered and then dissolved in *an equal weight of Oleic Acid* (slight warmth on a water bath will effect solution)—finally incorporating the Ointment base little by little. Thus made, the Ointment will not crystallise. It will be practically neutral.

Alongside this chemical work, certain clinical trials were kindly carried out for us by Mr. George Coats. We provided this oculist (without indicating which was which) with specially prepared samples 'No. 1' R.O.H. Formula (crystalline under the microscope), 'No. 2' a further Formula, 'No. 3' Neutral Oleate Formula.

The conclusion of the experiments was that No. 1 and No. 3 were satisfactory—no atropine irritation was produced and, therefore, that the *minute crystals are not harmful.* The Ointment should be *rubbed down thoroughly* on cooling if made without neutralising.

P1 **Atropinæ Methyl-Bromidum.** *Syn.* MYDRIASINE.
$C_{17}H_{23}O_3N-CH_3Br=384\cdot228.$
Dose.—$\frac{1}{64}$ grain to $\frac{1}{32}$ grain (**0·001 to 0·002 Gm.**).

Manufacture.—An addition product of Methyl-bromide to the alkaloidal base.

White crystals soluble in water 1 in 1 easily, and in alcohol 90% 1 in 8. Given internally for complaints similar to those for which atropine is employed. Also subcutaneously in croupous pneumonia, pleuritis sicca and appendicitis; dyspepsia with pyrosis (with sodium bicarbonate), and epilepsy (with bromide). As effect passes off rapidly it is useful in $\frac{1}{2}$ to 2% solution with cocaine hydrochloride 1% for dilating the pupil in suspected iritis for ascertaining whether adhesions exist.

For toothache, Atropine Methylbromide $\frac{1}{50}$ grain, with Aceto-Salicylic Acid 15 grains, has been given with good effect.

For bronchitic and pneumonic affections in children the following has been advised: Atropine Methylbromide $\frac{1}{20}$ to $\frac{1}{12}$ grain, Tartarated Antimony $\frac{1}{2}$ grain, Antipyrin 6 grains, Syrup 1 ounce, Fresh Ipecacuanha Infusion (1 in 200) to 4 ounces. *Dose.*—1 drachm every 2 hours.

To control irregularity of heart action may be combined with Digitalis Infusion.

[P1] **Homatropine,** $C_{16}H_{21}NO_3=275·258$.

Manufacture of Homatropine. — Heat Atropine Mandelate seven days on the water bath with dilute Hydrochloric Acid. Precipitate the clear liquid with Potassium Carbonate and shake out the oily base with Chloroform. Remove the latter and convert the base for further purification into the Picrate. Dissolve the picrate in water *q.s.* to retain it in solution in the cold. Add excess of Potassium Carbonate and shake out with Chloroform. The base is difficult to obtain crystalline.

[P1] **Homatropine Hydrobromide,** [P1] **Hydrochloride,** $C_{16}H_{21}NO_3.HCl=311·726$, and [P1] **Salicylate** $C_{16}H_{21}NO_3.C_7H_6O_3 = 413·341$ are readily obtainable in minute granular white crystals. Their solutions act as quick and decided local mydriatics, the pupil rapidly returning to its normal condition. The mydriatic action commences in $\frac{1}{4}$ to $\frac{1}{2}$ hour, and disappears in from 6 to 24 hours. The salts are freely soluble in water; Homatropine (the base) is nearly insoluble in water, but soluble in oils, or 1 in 100 of soft paraffin. *Dose of each.*—$\frac{1}{80}$ to $\frac{1}{20}$ grain (**0.0008 to 0.003 Gm.**)

Action in checking night-sweating is said to be inferior to atropine and picrotoxin. Large doses may cause, like atropine, staggering gait, and delirium in children. Homatropine slows the heart beats and renders them irregular in force and rhythm.

Ⓟ **Oleum Homatropinæ.** A 2% solution in Castor Oil, dissolved by heat (*using the smallest amount possible*). Powder the Homatropine first.

[P1] **Oleum Homatropinæ cum Cocaina** R.O.H., contains in addition 2% of Cocaine.

Homatropine Oil is used in preference to Atropine in estimating lesions of refraction; inconvenience of mydriasis may be partially overcome by Eserine. These oily solutions are not washed out by the tears.

[P1] **Homatropinæ Hydrobromidum.** **U.S., P.G.V. P. Helv., P. Svec.** and **P. Jap.** $C_{16}H_{21}NO_3HBr=356·186$.

Dose.—$\frac{1}{80}$ to $\frac{1}{20}$ grain (**0.0008 to 0.003 Gm.**). (U.S. *av.* $\frac{1}{120}$ grain). In minute trimetric crystals, soluble 1 in 6 of Water.

Ⓟ **Guttæ Homatropinæ R.O.H.**, 1 or 2%.

P1 **Guttæ Homatropinæ cum Cocaina, R.O.H.**

Homatropine Hydrobromide 1 or 2, and Cocaine Hydrochloride 2 in Water 100.

Menthol 2 grains, Methyl Salicylate 2 minims, and Tincture of Iodine 2 minims, to the pint of distilled water as an antiseptic solvent of Homatropine and other alkaloidal salts for eye work.—N. Bishop Harman, B.M.J. ii./16,178. See also *ibid.* i./20,599.

Ⓟ **'Sterules' (Ophthalmic) of Homatropine Hydrobromide Solution,** 1% are prepared, also

P1 **'Sterules' (Ophthalmic) of Homatropine Hydrobromide Solution** 1% with **Cocaine Hydrochloride** $2\frac{1}{2}$%.

Ⓟ **Injectio Homatropinæ Hypodermica,** 1 in 120, is used. *Dose.*—1 to 6 minims (**0·06 to 0·4 Cc.**).

Ⓟ **Tablets, Hypodermic,** contain $\frac{1}{200}$ grain.

(**Sterile Capsules of Distilled Water,** containing 1 drachm are useful for dissolving hypodermic tablets in the syringe.)

Ⓟ **Lamellæ Homatropinæ** (*Off.*) contain $\frac{1}{100}$ grain (**0.0006 Gm.**) of Homatropine Hydrobromide.

P1 **Lamellæ Homatropinæ et Cocainæ (Gelatin Ophthalmic Discs)** contain of each $\frac{1}{50}$ grain (**R.O.H.**) for paralysing the accommodation, also made $\frac{1}{200}$ grain of each, also Homatropine $\frac{1}{5000}$ grain with Cocaine $\frac{1}{200}$ grain, and $\frac{1}{5000}$ grain of each.

P1 ✶**Eumydrine.** **Methyl-Atropine Nitrate.**

$C_{16}H_{19}NO_3.CH_3.CH_3\ HNO_3=366{\cdot}318$.

TRADE MARK 322533, PATENT 25,804/1901 became void 1906.

Manufacture. — Although the patent specification mentions the use of Methyl Nitrate, to be employed by direct addition in presence of Methyl Alcohol at a temperature of 110° C. in a closed vessel for 2 hours, we believe that the more rational procedure would be to heat the alkaloidal base with Methyl Iodide in Methyl Alcohol Solution to 100° C., forming Methyl-Atropine Hydroiodide, and then to convert this into Methyl-Atropine by means of freshly precipitated Silver Oxide. Finally prepare the nitrate in the usual manner.

A white odourless powder, M.pt. 163° C., soluble in water, a powerful mydriatic, and less poisonous than Atropine. 1% or 2% solution dilates the pupil after 25 minutes, the maximum is reached in 50 minutes. Dilatation persists for 12 hours.

AURANTIUM.

Aqua Aurantii Floris (*Off.*). AQUA NAPHÆ, **Ph. Ned.** *Dose.*—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**) of the diluted water.

Distilled from the flowers of *Citrus Aurantium*, var. *Bigaradia*. Is a saturated solution of the oil, and must be diluted immediately before use with twice its volume of distilled water.

Oleum Aurantii Dulcis expressed from the fresh peel of the fruit of this plant.

Sp. Gr. at 15° C. 0·847–0·852, O.R. +96° to +98° at 20° C. (at Messina).

Terpeneless Oil of Orange is prepared, being many times more potent in flavour and soluble in 60% spirit, *c.f.* Vol. II. for further details of this product.

Oleum Neroli. The oil obtained in the distillation of above flowers is used in perfumery. Dilution with twice its volume of absolute alcohol preserves it. *For analytical data of this Oil vide Vol. II.*

Cortex Aurantii (*Off.* and **Indicus**).

Dried and fresh outer peel of the Bitter Orange (in India other varieties may be used if aromatic and bitter).

Tinctura Aurantii (*Off.*). 1 of fresh peel in 4 of Alcohol (90%).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Boa says that 90% Alcohol is too strong—it takes out the whole essential oil content, terpene, citral, etc. About 10% only of Essential Oil of Orange Peel is flavouring and is soluble in comparatively dilute alcohol, therefore make the Tincture using equal volumes of 90% alcohol and water.—P.J ii./09,142. 70% suggested.—P.J. i./09,294.

Mixtures containing Salts of Iron will become dark in colour with all preparations of orange peel.

Syrupus Aurantii (*Off.*). Tincture of Orange 1, Syrup 7.

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Infusum Gentianæ Compositum Concentratum.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Gentian and Orange Peel in No. 10 pdr. each 2, Lemon Tincture 2, Orange Tincture 1, Alcohol 90% 3·5, Diluted Chloroform Water to 20 by process (a) for infusions (*q.v.*) 1 diluted to 8 resembles B.P. Infusion.

Preparations of Sweet Orange, Tincture, Syrup, Acid Syrup and Aromatic Syrup Those of Sweet Orange keep indefinitely.—C.D. i./10,323.

AURINARIA.

Ear cones or aural bougies are made either with Gelatin or Cacao butter basis, and are medicated :—

Aurinarium—

Acidi Borici 1 gr.
Acidi Carbolici $\frac{1}{10}$ gr.
P1 Cocainæ Hydrochloridi $\frac{1}{10}$, $\frac{1}{5}$ gr.
*Unguenti Hydrargyri Nitratis $\frac{1}{3}$ gr.
*Iodoformi $\frac{1}{2}$ gr.
P1 *Morphinæ Hydrochloridi $\frac{1}{10}$ $\frac{1}{5}$ gr., atque cum Cocaina $\frac{1}{10}$ gr.
P1 *Morphinæ $\frac{1}{10}$ Cocainæ $\frac{1}{10}$ Acidi Borici 1 gr.
P1 *Morphinæ $\frac{1}{10}$ gr., Ext. Bellad. $\frac{1}{5}$ gr.
℗ *Opii, $\frac{1}{5}$, P1 $\frac{1}{2}$ gr.
*Plumbi Acetatis $\frac{1}{2}$ gr., atque cum Acid. Borico 1 gr.
℗ *Plumbi Acetatis et Opii $\frac{1}{5}$ gr.
*Zinci Sulphatis $\frac{1}{2}$ gr.
*Zinci Sulphocarbolatis $\frac{1}{2}$ gr.

They should be retained with a pledget of cotton wool.

AURUM.

Au=197·2.

For dental fillings the metal is employed in "cohesive" and "non-cohesive" form.

Auri Bromidum. $AuBr_3$=436·96.

Dose.—$\frac{1}{64}$ to $\frac{1}{10}$ grain (**0·001 to 0·006 Gm.**), increased to $\frac{1}{5}$ grain, well diluted.

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* These Aurinaria, unless ordered to the contrary, are prepared with cacao butter basis. The others are prepared with Gelatin. Cacao butter basis with wax is more suitable for export to the tropics.

A brown powder, soluble in water 1 in 75.

Uses.—In epilepsy, hysteria and migraine, is well tolerated. In nervous dyspepsia, amenorrhœa, and chronic Bright's disease. Epileptics who have taken it sometimes remain for years free from attacks. Useful in alcoholic neurasthenia; the 'Gold Cure' combined with Hyoscyamine (or Atropine) and Strychnine treatment has proved of value.

P1 **Liquor Auri et Arsenii Bromidi.**

Auric Bromide $1\frac{1}{2}$ grains, Oxybromide of Arsenium 3 grains [or Clemens' Solution (*q.v.*) 192 minims], Distilled Water to 1 ounce. *Dose.*—5 to 10 minims (**0.3 to 0.6 Cc.**).

Liquor Auri et Hydrargyri Bromidi.

Auric Bromide, Mercuric Bromide, of each $1\frac{1}{2}$ grains, Distilled Water to 1 ounce. *Dose.*—5 to 10 minims (**0.3 to 0.6 Cc.**) has been used in neurasthenia, epilepsy, syphilis, and acne.

GOLD CHLORIDE, VARIETIES OF, IN COMMERCE.

Auri Tri-Chloridum (Purum), $AuCl_3$=303·58. Contains about 65% Au. and is official in FR. CX. and the Portuguese Pharmacopœia. This salt is in very little use in this country. A brown variety is also made. It contains xH_2O.

Auri Tri-Chloridum Acidum. *Syn.* **Aurochloric Acid.** $AuCl_3.HCl.4H_2O$=412·112.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**), increased to $\frac{1}{4}$ grain. In yellow crystals; contains about 50% of gold. Is deliquescent and easily soluble in water. Has been given as an alterative in phthisis.

Sterules of this Salt and of Gold and Sodium Chloride in various amounts have been made.

Auri et Sodii Chloridum. **Gold and Sodium Chloride** $AuCl_3.NaCl,2H_2O$=398·072 (FR. CX.)

Dose.—$\frac{1}{30}$ to $\frac{1}{12}$ grain (**0·002 to 0·005 Gm.**), increased to $\frac{1}{2}$ grain in a pill with kaolin ointment.

This is the ordinary **Commercial "Chloride of Gold,"** *e.g.*, the "Scales" Brand, as largely used in photography. An orange-yellow crystalline, deliquescent powder, soluble 1 in 2 of water, only partially soluble in alcohol. The FR. CX. preparation contains a *molecule of each salt* combined, yielding approximately 50% of metallic gold. The U.S. preparation is a mixture of *equal parts by weight* of the two salts. It yields 30% of gold. This 30% product is not largely used in this country. It is sometimes used as a caustic, and given internally for syphilis. Combined with strychnine it is useful in neurosis.

In locomotor ataxia, the Chlorides of Gold and Sodium $\frac{1}{10}$ grain in pill form seem to have some power of retarding the degenerative process; arsenic $\frac{1}{20}$ grain in solution thrice daily is also believed to act in the same way. Alternate monthly courses of each advocated.—Whitla, Pract. Med.

Cirrhosis of the kidney has been well treated by Chloride of Gold and Sodium, said to improve character of the urine, to diminish the frequency of nocturnal micturition and to increase general well-being.—Tirard, Med. Treatment, p.393.

Commercial "Chloride of Gold and Sodium" consists of **Auri et Sodii Chloridum** (50% Au) mixed with an equal weight of sodium chloride. It contains, therefore, 25% Au approximately.

P1 **Auri et Potassii Cyanidum.** — $KAu(CN)_2+2H_2O$=324·362.

Dose.—$\frac{1}{64}$ to $\frac{1}{3}$ grain (**0·001 to 0·02 Gm.**).—*with caution.*

White crystalline soluble powder.

In lupus and in syphilis has been used. Intravenously the dose was found to be 0·02 to 0·05 Gm. for adults, and 0·0005 to 0·03 Gm. for children. To the dose in 1% solution 50 Cc. of Normal Saline Solution are added, and given every second or third day to the extent of 12 injections. The injection is said to be quite painless. After 48 hours a local reaction occurs, the effect of the injections on lupus vulgaris is undeniable; in syphilis the results are also good. No experience of the effect of the treatment on pulmonary tuberculosis.—C. Brock and M. A. Gluck; Munch. Med. Woch., Jan. 14,'13, per Pres.

Lupus successfully treated by hypodermic injection of chloride of gold with cyanide of potassium; doses from $\frac{1}{1000}$ to $\frac{1}{100}$ grain of each.—B.M.J.E.i/91,166.

BARIUM.

Ba=137·37.

Barii Sulphidum.—BaS=169·43.

Dose.—$\frac{1}{2}$ to 1 grain in pills coated so as to be more likely to dissolve in the intestines than in the stomach.

A greyish yellow powder, soluble in water, given as an alterative in syphilitic affections.

Barium Sulphide Depilatory. *Syn.* (Causticum Barii).

Barium Sulphide, in fine powder from 1 to 3, Wheat Starch 3.

When required for use, make into a cream with water, spread on the part and let it remain five or ten minutes, then remove with a blunt knife.—N.B.—It temporarily reddens the skin.

Another formula is Barium Sulphide 5, Powdered Soap 1, French Chalk 7, Starch 7, Benzaldehyde to 24. One part of this mixed with 3 of water, applied to the skin, and to avoid possible dermatitis, is washed off after 5 minutes. Applied in hypertrichosis from time to time will keep the growth under.

Barii Sulphas.—$BaSO_4$=233·43.

Dose.—For 'X' Ray work only, 2 to 5 ounces (**60 to 150 Gm.** approx.) in a cornflour (**Mondamin** is a trade name for cornflour) or other 'meal' of about 6 to 15 ounces.

A heavy white powder insoluble in water and acids.

In 'X' ray diagnosis for outlining portions of the alimentary tract, recently employed instead of Bismuth Carbonate and Subnitrate (*q.v.*).

The substance when pure—it is probably one of the simplest chemicals the pharmacist is called upon to produce—has the advantage of being totally insoluble. Cases of Bismuth poisoning have resulted from the use of Bismuth Salts. These latter, however, have the advantage of higher molecular weight, and hence form darker shadows.—L. ii./12,48; ii./13,1616.

Barium Sulphate Suspensions in Olive Oil 10, 20%, etc., in bladder examination.—L. i./14,236.

For an opaque enema—Barium Sulphate 12 ounces mixed with Kaolin and warm water.—A. C. Jordan, B.M.J. ii./13,1348.

BELLADONNA.

Deadly Nightshade.

P1 "*Belladonna and all preparations or admixtures (except Belladonna Plasters—which are* Ⓟ) *containing* 0·1 *or more per cent. of Belladonna Alkaloids.*"

All parts of the plant *Atropa Belladonna* (*Solanaceæ*) yield the alkaloids atropine and hyoscyamine. The root contains from 0·3 to 0·8% or even more exceptionally of total alkaloids. (Maben states rarely as much as 0·5%.) The leaves contain 0·2 to 0·7%, principally Hyoscyamine.

For details as to varying Alkaloidal content of the Drug and Assay Methods see Vol. II.

Antidotes.—See Atropine, Poisoning by belladonna is well treated by pilocarpine.

Poisoning by children eating Belladonna berries. Pilocarpine 1/10 grain hypodermically, hot water bottles, subsequently more pilocarpine (1/6 grain) and again repeated with soap enema. Recovery.—Mary E. Joll. **L. ii./16**, 647.

P1 **Belladonnæ Folia** (*Off.*), U.S., and P. Helv. contain not less than 0·3% total or mydriatic alkaloids. *Dose.*—1 grain.

Those of Fr. Cx. have no standard. Maximum single dose 2 grains, maximum during 24 hours 7½ grains approximately.

P1 **Belladonnæ Radix** (*Off.*) without standard, U.S. requires 0·45% total alkaloids of Belladonna.

Dose.—¾ grain (0·5 Gm.).

Uses.—Externally relieves the pain of rheumatism, neuralgia, chordee, and local inflammations, as of the breast. In leucorrhœa, vaginal injection of Tincture 3, Sodium Bicarbonate 1, and Water 100 useful.—R.

Internally relieves spasm, palpitation, menstrual pain, headache, whooping-cough, petit mal, checks profuse perspiration, and incontinence of urine. In acute sore throat. Acts on the eye as a mydriatic. Relieves the dyspnœa of asthma.

Though used " to allay the sense of griping " in the intestines there is no evidence that it does so.—B.M.J. ii./09,540.

Heart failure in diphtheria treated with.—L. i./06,282.

A rash on the skin, said to be like that of scarlet fever, may be produced by internal and local use of Belladonna.—Ringer and Sir Lauder Brunton.

May produce congestion of the throat.—B.M.J. ii./09,542.

Obesity associated with voracious appetite well treated. By its inhibitory action on the secretion of the gastric glands Belladonna reduces hyperacidity of the gastric juice and thus takes the edge off the appetite. Especially indicated where there is cardiac weakness which prohibits physical exercises.—B.M.J.E. ii./13,39, *c.f.*, also Atropine.

P1 **Collodium Belladonnæ.**—*Syn.* **Emplastrum Belladonnæ Fluidum B.P.C.** Modified, Martindale.

Shake liquid Extract of Belladonna (*Off.*), 50 Magnesium Oxide Light 1, with Canada Turpentine 4, castor oil 2 and ether 40, allow to stand 12 hours. Decant, filter, dissolve camphor 1½, and pyroxylin 2½ in the mixture and add ether *q.s.* to 100. (In 1901 was prepared from alcoholic extract of leaf.)

Note.—The process employed for this preparation in the B.P.C., results in only about 75% of the total Alkaloid being extracted—the remaining 25% being left behind in the Liquid Extract mixture at the bottom of the bottle. This unsatisfactory condition of things is practically overcome by the use of Magnesia as indicated in our formula.

Ⓟ **Emplastrum Belladonnæ.** (*Off.*) (Ⓟ *c.f.* Emp. Plumbi).

The B.P. '98 plaster produced toxic symptoms (skin irritation).—It was only half the strength of that of the B.P. 1885, but it was still too strong to be used with safety. The *Off.* plaster is now again reduced to ½ strength, viz., it contains 0·25% alkaloids.

Dixon says Atropine has no action on mammary secretion as the latter is not under nervous control (action solely on nerve endings).—B.M.J. ii./09,329,540. *See also* K. Mackenzie under Pituitary Extract.

Bee and wasp stings are well treated by belladonna plaster—if slight, left on short time; if severe (? entered vein), several days may be necessary—gives considerable relief. Probably good for mosquito stings also.—Na. May 4,/11, p. 312.

Ⓟ **Emplastrum Belladonnæ Extensum.**

Belladonna plaster in rubber combination spread on calico in porous sheets 7 in. by 5 in. and in yard rolls 7 in. wide, porous and non-porous, also prepared with belladonna and aconite combined.—(*American*).

Ⓟ **Emplastrum Belladonnæ U.S., IX.** An adhesive plaster containing 30% of Extract of Belladonna leaves and not less than 0·35% or more than 0·4% of the alkaloids of the leaves.

Ⓟ FR. CX. has Belladonna Extract (FR. CX. *q.v.*) 1, Elemi 1, Diachylon Plaster (FR. CX.) 2.

[P1] **Extractum Belladonnæ Viride** (B.P. '98).

Dose.—¼ to 1 grain (0·016 to 0·06 Gm.), increased to 2 grains or more.

A green extract prepared from the expressed juice of leaves and young branches (3 to 3½ ounces are procurable from a pound of leaves); it contains from 0·5 to 2·0% (average 1) of alkaloids, and standardised to contain 1%.

[P1] **Extractum Belladonnæ Siccum** (*Syn.* **Alcoholicum**) (*Off.*)

Dose.—¼ to 1 grain (0·016 to 0·06 Gm.).

This is now prepared *from the leaf*—it is a mixture of alcoholic extract and powdered leaf, containing 1% of alkaloids=F.I. nearly.

Enuresis in children is best treated by increasing doses of Belladonna extract at bed time, tonic measures, such as codliver oil, iron and nux vomica should be employed during the day time.—Tirard, Med. Treatment, p. 407.

[P1] **Extractum Belladonnæ F.I.** to be a "solid" extract (containing about 10% of water) prepared by means of alcohol 70% from the leaf.—FR. CX., and P. DAN. agree with F.I. The FR. CX. follows the F.I. method of making and gives a method of estimating, but does not set up a standard. It states max. single *dose* ½ grain. Max. in 24 hours 1½ grains approx.

[P1] **Extractum Belladonnæ Foliorum U.S.IX.**, made with 3 parts alcohol and 1 water as solvent and contains added glucose for Pilular consistence. Powdered Extract is made differently, but contains the same percentage of alkaloids. Contains a mean of 1·25% Belladonna alkaloids.

[P1] **Extractum Belladonnæ, P. Austr.**, is alcoholic from the leaves and contains 2% alkaloids; [P1] **Ph. Ned.** is the same but contains not less than 1·15% alkaloids [P1] **P. Belg.** contains 1·5% alkaloids. For average yield of alkaloid, see Vol. II.

[P1] **Extractum Belladonnæ Liquidum** (*Off.* and B.P. '98).

Dose.—⅓ to 1 minim (0·02 to 0·06 Cc.).

Prepared from Belladonna root in fine powder, by repercolation process, adjusting so that the extract contains 0·75% alkaloids.

P1 **Fluidextractum Belladonnæ Radicis, U.S.**
Average dose.—1 minim (0·06 Cc.) Hydroalcoholic percolate; contains 0·45 Gm. Belladonna alkaloids in 100 Cc. *For assay vide Vol. II.*

P1 **Glycerinum Belladonnæ,** B.P.C., R.O.H.
Green Extract of Belladonna, 1 ounce; Boiling Distilled Water, 1 drachm. Rub in a warm mortar to a smooth paste, and add Glycerin, *q.s.*, to 2 ounces (fluid).

To check pain and inflammation, is often painted on boils, abscesses and carbuncles, and covered with a poultice, also applied on lint to the breasts to disperse milk.

Suggested addition of 6 grains of Tragacanth to the ounce to thicken.—P.J. ii./06,401.

P1 **Linimentum Belladonnæ** (*Off.*).
Camphor 1, Alcohol (90%) 6. Dissolve and add Liquid Extract of Belladonna 10, Distilled Water 2, Alcohol (90%) *q.s.* to 20. A useful sedative for neuralgia and rheumatism. Contains 0·375% alkaloids.

U.S. has Camphor 5, Fluidextract of Root to 100.

Sprinkled on impermeable piline relieves lumbago.

Poisoning by the Methylated Liniment. Strychnine hypodermically, strong tea, and making the patient vomit, brought her round.—B.M.J. ii./07,1155.

P1 **Linimentum Belladonnæ cum Chloroformo.** Chloroform Liniment 1, Soap Liniment 1, Belladonna Liniment 2.

P1 B.P.C. Chloroform 1, Belladonna Liniment 7. (The previous form may be better for sensitive skins.)

Ⓟ **Pilula Quininæ cum Belladonna,** R.O.H.
Green Extract of Belladonna $\frac{1}{5}$ grain, Quinine Sulphate 1 grain, Confection of Roses *q.s.*

P1 **Pilula Belladonnæ, Nucis Vomicæ et Cannabis.**
Extract of Belladonna, Nux Vomica Extract and Cannabis Extract, of each $\frac{1}{2}$ grain. For the constipation in gastric ulcer. The cannabis has a good effect on the mental side, belladonna regulates peristalsis and the nux vomica has a good effect as an aperient and for improving tone of the gut.—M.P.C., Nov. 9, 1910, 481.

P1 **Suppositoria Belladonnæ** (*Off.*).
B.P. '98 contained Alcoholic Extract of Belladonna (root) 1$\frac{1}{2}$ grains (0·1 Gm.). *Off.* is now made same alkaloidal strength from liquid extract.

Ⓟ **Pessaries** (60 grains weight) may also be made containing the same or double the quantity of extract. *Vide also* **Ovules.**

Unilateral convulsions produced by, together with usual dryness of throat, dilated pupils (special idiosyncrasy).—B.M.J. i./06,1019.

P1 **Suppositoria Belladonnæ** $\frac{1}{2}$ grain, **et Morphinæ Hydrochloridi** $\frac{1}{4}$ grain.
These possess a useful sedative effect, and are valuable in irritated and painful conditions of the rectum and prostate and for chordee.

Ⓟ **Tinctura Belladonnæ** (*Off.*).
Dose.—5 to 15 minims (0·3 to 1 Cc.).
Now made 10% *with dried leaf* and standardised to 0·035% alka

loids=F.I. approx. Fr. Cx. and U.S. are similar. B.P. '98 was Liquid Extract of Belladonna (root) 1, Alcohol (60 per cent.) *q.s.* to 15. Hence the new tincture differs in colour. *It is $\frac{7}{10}$ strength of B.P. '98.*

Uses.—Relieves the spasm of asthma and bronchitic cough; also bladder spasm set up by calculi and prostatic irritation. Full doses are useful for incontinence of urine. Of value in dyspepsia (*vide* ref. *infra*).

Flavoring.—Syl Myristicæ, Syl Rosæ; Syrupus Aurantii.

P1 **Tablets** are prepared equivalent to 2 and 5 minims weighing 1 and 2 grains respectively.

Appendicitis has been treated by full doses (10 to 15 minims) with sodium salicylate.

Exophthalmic goitre well treated with belladonna, and with arsenic, bromide, and digitalis added.—B.M.J. i./06,914; L. ii./11,1614.

In enuresis valuable, give first potassium citrate, when the urine is hyperacid or Sodium Acid Phosphate if markedly alkaline.—B.M.J. i./06,903.—T. W. Simpson, Edin. Med. Jl., Jan., 1913.

Broncho-pneumonia sometimes well treated in early stages with 4 to 5 minim doses or $\frac{1}{4}$ grain of extract every 3 or 4 hours according to age of child and severity of case—combine with diuretics and diaphoretics.—M.P.C. Jan. 16, '09,601.

In dyspepsia administration of 5 minim doses of Tincture before food results in reduction of acid values both absolute and relative of the stomach contents. Exerts an influence in inhibiting and relieving spasmodic contractions.—B.M.J. ii./10,1775.

The volume of the gastric contents does not diminish, though the percentage of Hydrochloric Acid in the gastric contents is always diminished. This differs strikingly from the effect of Atropine on other glands.—P.R.S.M., Med. Sect., Dec./10,23.

For ptyalism (in a patient affected with paralysis agitans) 10 drops of Belladonna Tincture thrice daily or Pilocarpine Nitrate $\frac{1}{36}$ grain. —B.M.J. i./13,1143.

P1 **Mistura Belladonnæ Xanthoxyli et Hyoscyami.** *Syn.* TOWNS' SPECIFIC.

Dose.—6 to 8 minims (**0.4 to 0.5 Cc.**).

Belladonna Leaf Tincture (U.S. 1890) 2, Fluidextract of Xanthoxylum 1, Fluidextract of Hyoscyamus 1.

This is equivalent to a dose of a little less than 3 to 4 minims B.P '98 Tincture.

Said to be specific in morphinism, cocainism, and alcoholism.

P1 **Linimentum Belladonnæ Æthereum.**

Prepared with Ether, 1 in 1½, with Camphor $\frac{1}{20}$. Recommended in place of Alcoholic Liniments for quicker absorption.—L. ii./90,67; *N.B.*—Name altered. Previously called *Ethereal Tincture.*

P1 **Unguentum Belladonnæ** (*Off.*).

Now contains a basis of Benzoated Lard and Wool Fat. Prepared by evaporating Liquid Extract of Belladonna *q.s.* to provide 0·6% alkaloids, as in B.P. '98.

Said to be too strong and may cause unpleasant symptoms.—B.M.J. ii./11,162.

To lessen excessive secretion in nasal catarrh, this ointment has been employed diluted 5 to 10 times with Soft Petroleum and a small proportion of Tannin or Gallic Acid added.

Unguentum Populeum, P. Belg. Macerate Dry Belladonna Leaves 125, Dry Henbane Leaves 125 and Dry Poplar Buds 200 (all bruised) in Alcohol 90% 150 for 2 hours; transfer to a water-bath with Lard 1000, heat 3 hours with constant stirring until the Alcohol has evaporated. Strain, press and stir until the ointment sets. The formula in Fr. Cx. differs from this.

BISMUTHUM.

Bi=208·0.

The absorbent action of the preparations of bismuth taken internally is increased by combination with antiseptic compounds. These combinations have been much recommended in those disorders of the digestive tract in which several infectious diseases make their early manifestation. Thus the salicylate, and naphthol, phenol, pyrogallol and bromophenol compounds have been brought into use. These check the fermentative processes forming ptomaines, yet, it is said, do not interfere with intestinal digestion. Bismuth compounds are in general *incompatible* with potassium iodide, the insoluble brown bismuth tri-iodide being formed.

Bismuth Poisoning.—The most striking features are stomatitis a black line and white diphtheritic membrane on the gums and bismuth in the urine. Beck's Paste has caused poisonous symptoms.—L. i./13,1039.

Bismuthi Benzoas, Bismuth Oxybenzoate.

C_6H_5—CO.O (BiO) (?)=345·075.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) thrice daily.

A white powder insoluble in water. Fr. Cx. requires 64 to 65% Bismuth Oxide. Antiseptic, internally in gastro-intestinal diseases, externally to chancroid, indolent and sloughing ulcers.

Bismuthi Carbonas. *Syn.* **Bismuth Oxycarbonate or Subcarbonate.**

$(Bi_2O_2CO_3)_2.H_2O$ = 1034·116. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**).

Suspended in an ounce of water by means of a drachm of mucilage of tragacanth or about 6 grains of compound powder of tragacanth. Prescribers should indicate if a suspending agent is required. A light variety of the substance needs no suspending agent.

$5\ Bi_2O_3.Bi_2(CO_3)_3$ and $Bi_2O_2CO_3$—differing from the ordinary Carbonate—have been prepared.—P.J. ii./11,301.

The following forms an agreeable dose:—

Mistura Bismuthi. *Dose.*—1 ounce.

Bismuth Oxycarbonate 10 grains, Sodium Bicarbonate 10 grains, Mucilage of Tragacanth 1 drachm, Compound Tincture of Cardamoms 30 minims, Spirit of Chloroform 10 minims, Cinnamon Water to 1 ounce. **Tablets of Bismuth Carbonate** contain 5 grains, to be crushed and swallowed with a little water.

For X-ray Diagnosis of conditions of œsophagus and stomach large doses are frequently ordered.

'Standard' Opaque Meal.

Bismuth Carbonate 4 ounces, Lactose 1½ ounces, Water, *q.s.*, to make a thin emulsion—less than a tumblerful.—A. C. Jordan, B.M.J. ii./13,1348

'Homogeneous Bismuth Mixture.'—For use in radiography. $3\frac{1}{3}$ ounces (100 Cc.) contains $\frac{2}{3}$ ounce (20 Gm.) approximately.

Bismuth Carbonate 120, Gum Arabic 20, Tragacanth 5, Syrup 150, Water 350. Does not separate into two layers and hence give deceptive effect in radiography.—B.M.J.E. i./13,42.

For several reasons Bismuth Oxychloride is preferable. **Barium Sulphate** is also used *q.v.*

Gastritis is usually well treated by a dose of Bismuth Carbonate with a small dose of Morphine and 2 or 3 minims of Dilute Hydrocyanic Acid.—Whitla, Pract. Med.

In ulcerative colitis Bismuth Carbonate 15 grains to the pint, also Potassium Permanganate 1 in 30,000 useful and soothing. In the later stages irrigation with Perchloride 1 in 20,000, Zinc Sulphate 4 drachms in 3 pints and Silver Nitrate 5 to 10 grains to the pint, effectual when used alternately. Chlorodyne was beneficial as anodyne.—B.M.J. i./11,864.

Intimately mixed with Liquid Paraffin it is stated to be better tolerated. In this way it is not attacked by the hydrochloric acid of the stomach.—A. Vicario. Jour. Pharm. Chim., 1914, 9, p. 458.

Hyperacidity is well treated by powders containing Bismuth Carbonate 30 grains, Magnesium Carbonate 20 grains, and Sodium Bicarbonate 30 grains.—G. Rankin, B.M.J. i./15.1036.

An efficient mode of prescribing freshly precipitated Bismuth Carbonate is in the form of **Glycerinum Bismuthi Effervescens,** *q.v.*

Ⓟ * Tedeff. (T M. No 2 4175). *Dose.*—1 to 2 drachms in water. Contains opium, bismuth and digestive ferments. A palatable granular effervescent preparation, for use in sickness and derangement of digestive functions.

Ⓟ **Pastillus Bismuthi Carbonatis** (3 grains) **cum Morphinæ Acetate** ($\frac{1}{40}$ grain), *v.* p 429.

P1 **Collapsubes** (with rectal tube attachment) of Bismuth 20% Morphine $\frac{1}{2}$%, and Cocaine 3% Ointment,—**Unguentum Bismuthi Morphinæ et Cocainæ**, *Allingham*, with soft paraffin basis, are useful as an astringent in hæmorrhoids and for allaying irritation.

Liquor Bismuthi et Ammonii Citratis. *Syn.* **Liquor Bismuthi.** (*Off.*). *Dose.*—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Is now prepared by interaction of Bismuth Subnitrate with Citric Acid and Water until the product is soluble in Ammonia, and then after washing dissolving in Ammonia. Contains (as B. P. '98) 5 grains of citrate = 3 grains of oxide of bismuth in 1 drachm. For some data as to manufacture, *see Vol. II.*

Flavoring.—Syl Lavandulæ, Syl Amygdalæ Amaræ ; Syrupus Aromaticus.

In following the B.P. directions the mixture of Bismuth Subnitrate, Citric Acid and water sets hard and is not completely soluble in ammonia.—F Penfold suggests alteration of directions.—P.J.ii./16,567.

Evaporated to a syrup and spread on glass and dried it produces :—

Bismuthi et Ammonii Citras, U.S.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

In soluble shining pearly or translucent scales. 1 Gm. yields not less than 0·46 or more than 0·52 Gm. Bi_2O_3.

Liquor Bismuthi Concentratus, B.P.C. (Double strength of Liquor *Off.*).

Dose.—15 to 30 minims (1 to 2 Cc.).

Dissolve Bismuth Subnitrate 14, with gentle heat in Nitric Acid (*Off.*). 10 previously diluted with an equal volume of water and add Citric Acid 10 dissolved in distilled water 14. Add gradually with stirring Sodium Bicarbonate 17·5 previously mixed with distilled water 14; wash the precipitate by decanting until free from nitrates and dissolve it by adding Solution of Ammonia 12 or *q.s.* Finally add Ammonium Citrate Solution 24 and make up to 100 with water.

Lithium Bismutho-Citrate.

Dose (suggested).—2 to 5 grains (0·12 to 0·3 Gm.), as also the analogous Potassium and Sodium Bismutho-Citrates can be prepared by combining freshly precipitated Bismuth Citrate with hydroxides of the alkalis. The Lithium compound is stated to be useful as a gout remedy.—R. C. Cowley, C.D. i./13,212. *c.f. Vol. II under Liquor Bismuthi.*

✱ **Lac Bismuthi** (T.M. 15268). *Symes.* *Dose.*—1 to 2 drachms. A preparation of Bismuth hydroxide. May be prescribed with hydrocyanic acid, alkalis, &c.

Ⓟ **Liquor Bismuthi Sedativus.** *Syn.* ✱**Bisedia.** (T.M. 252630) *Schacht.*

Dose.—1 drachm (4 Cc.) containing bismuth and pepsin with $\frac{1}{24}$ grain morphine hydrochloride, 2 minims of hydrocyanic acid, and 5 minims of tincture of nux vomica.

✱**Bismosal** (T.M. 314185). *Dose.*—$\frac{1}{2}$ to 1 drachm (2 to 4 Cc.). Children, 5 to 20 minims (0·3 to 1·2 Cc.). Contains Bismuth as hydroxide in suspension with Salol. In treatment of diarrhœa.

Bismuthi Citras, U.S. VIII. $BiC_6H_5O_7=397{\cdot}07$. *Dose.*—2 to 5 grains (0·12 to 0·3 Gm.).

A white crystalline powder, yielding not less than 56 nor more than 58% pure Bismuth Oxide (U.S.). Insoluble in water and alcohol 90%, but soluble in ammonia. It is astringent and stomachic.

Bismuth Citrate Gauze.—Is advanced to replace Iodoform Gauze being non-toxic and without odour. May be left in uterine cavity at least five days and still be free from offensiveness. For use after curettings, in nasal and aural surgery and for burns. Strips, 1, 2 and 3 inches wide, are made, also 36 inches.—L. ii./10,1142.

Elixir Bismuthi—*Dose.*—1 drachm (4 Cc).

Bismuth Citrate 1, Distilled Water 6, Solution of Ammonia $\frac{3}{4}$ or *q.s.* Dissolve, filter and add Simple Elixir *q.s.* to 30.

Ⓟ **Mistura Bismuthi cum Pepsina.**—*Martindale.*

Dose.—1 to 2 drachms (4 to 8 Cc.) diluted.

Contains Bismuth Citrate 2 ounces, Pepsin (soluble) 320 grains, Morphine 5 grains, Strychnine $1\frac{1}{2}$ grains, Dilute Hydrocyanic Acid 320 minims, Chloroform 30 minims, Saccharin Elixir 480 minims, Rosein Acetate *q.s.*, Water to one pint. This mixture will not deposit.

This preparation is retained as mixtures of this kind are frequently ordered, but the action of the Pepsin is seriously interfered with by the other ingredients. (*c.f. our experiments with Pepsin. Vol. II. et infra.*).

G. J. Mackay, Austral. Jl. Ph., Jan., 1911, examined a number of proprietary Bismuth and Pepsin Solutions and found them devoid of proteolytic activity.

Tabellæ Bismuthi et Pepsinæ.

Bismuth Carbonate 3 grains, Pepsin 3 grains, in chocolate basis. Useful digestive. Compressed Tablets are also prepared.

Tablets Bismuth, Pepsin and Cascara.—*Martindale.*

Dose.—One or two as required after meals.

Bismuth Carbonate 3 grains, Pepsin 3 grains, Cascara Extract 1 grain. A useful digestive.

Bismuth and Pancreatin.—*Martindale.*

Dose.—1 to 2 drachms (4 to 8 Cc.).

An alkaline stimulant digestive combining the sedative properties of Bismuth with the pancreatic ferment in a compatible form, and being an *alkaline* solution the mixture will promote gastric secretion. The preparation is so compounded that the properties of the ferment are retained in an active condition. We have determined the peptonising power of the preparation after keeping 14 months, and found it to be as active as when first made. Our investigations have shown that Pepsin and Bismuth mixtures are mutually incompatible, —the activity of the ferment in such mixtures is interfered with by the necessary alkalinity of the Solution of Bismuth. Pepsin is only ready to do its work in a slightly acid solution (equivalent to the Hydrochloric Acid of the normal gastric juice). The alkalinity of Bismuth and the Hydrochloric Acid required with Pepsin are incompatible in a mixture, resulting in the precipitation of Bismuth Oxychloride, hence the more compatible Bismuth and Pancreatin.

The preparation on good authority has been found of particular service as a digestive in the irritated condition of the stomach during convalescence from illness.

Ⓟ **Mistura Bismuthi Phenolis et Morphinæ.**

Dose.—1 ounce from 2 to 3 hours after every meal.

Bismuth Carbonate 40 grains, Phenol 2 grains, Solution of Morphine Hydrochloride 15 minims, Mucilage *q.s.*, Compound Gentian Infusian to 1 ounce.

Duodenal ulcer is relieved by this. For the constipation produced by large doses of Bismuth give **Pilulæ Hydrargyri Subchloridi, Rhei, Cascara et Capsicin.**—Guthrie Rankin.—B.M.J. ii./10,184.

Bismuthi et Cinchonidinæ Iodidum (short name '**Bisciniod**'— —*Martindale*). $C_{19}H_{22}N_2O.HI+BiI_3=1010{\cdot}979$.

Dose.—$\frac{1}{6}$ to 1 grain (0·01 to 0·06 Gm.).

Yellowish red powder insoluble in ordinary solvents.

Manufactured by double decomposition of a soluble Cinchonidine salt with Bismuth and Potassium Iodide Solutions. It contains about 20% Bismuth, 40% each Iodine and Cinchonidine

This substance, containing digestive, febrifuge and antiseptic constituents, should certainly find utility in therapeutics.

Bismuthum Hydroxydatum, Hydrated Bismuth Oxide. FR. CX.

BiO.OH.=241·008, *i.e.*, 1 molecule Bismuth Oxide containing the elements of ½ molecule water (3·73%).—FR. CX. Using theoretically 1 molecule of Bi_2O_3 and 1 molecule of water, one obtains 2 molecules of the above Hydrated Oxide. The Tri-hydrate $Bi(OH)_3$ is precipitated, which on drying at 100° C. decomposes into the monohydrate :—

$$Bi(OH)_3 = Bi\,O.OH + H_2O$$

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

An amorphous white insoluble powder, but soluble in Sulphuric Acid and Hydrochloric Acid in presence of water and in fixed alkalis in presence of Glycerin. Permanent in the air.

Shake Glycerin 150 Gm. with Bismuth Nitrate (cryst.) 100 Gm. add Water 100 Cc. in portions, shaking constantly to prevent formation of the Subnitrate. When dissolved filter if not clear, and pour the liquid, a little at a time, into a mixture of water 150 and 10% Potash Solution 850 Gm. When reaction complete add drop by drop Dilute Sulphuric Acid 100 Gm. (10% approx.—FR. CX.) mixed with its weight of water to neutralise, then render the mixture slightly alkaline. Wash the precipitate by decanting until a sample of the wash liquor leaves nothing on evaporation. Collect and dry at 100° C.

Employed in making Basic Bismuth Salicylate.

In an experimental quantity we obtained 45 Gm. of product from above quantities. The theoretical amount is 50% approximately

Uses.—A substitute for bismuth carbonate.

Magma Bismuthi, U.S. IX.

Dose.—Average, 1 drachm (**4 Cc.**).

A neutral thick suspension of Bismuth Hydroxide and Carbonate yielding on incineration 6% approx. of Bi_2O_3.

Bismuthi Nitras Crystallisatus, FR. CX. $Bi(NO_3)_3,5H_2O=484{\cdot}11$.

Dose.—5 to 10 grains (**0·3 to 0.6 Gm.**).

In colourless deliquescent crystals, which, if dissolved in a small quantity of water, give a solution with an acid reaction, this on further dilution throws out basic bismuth subnitrate. It is practically insoluble in Alcohol 90%, but soluble in cold Glycerin. *c.f.* Glycerinum Bismuthi Nitratis *infra.* It is astringent and antiseptic, and useful for the diarrhœa of phthisis.

Glycerinum Bismuthi Nitratis.

Bismuth Nitrate, in crystals 1, Glycerin to 4. Diluted 4 or 5 times with Glycerin is a stimulant application in eczema.

Glycerinum Bismuthi Effervescens (*Martindale*) may be prescribed thus :—

R. Glycerini Bismuthi Nitratis 4 ounces (or *q.s.*).

Eighty minims to be mixed with a solution made by dissolving *two* 5 grain Sodium Bicarbonate Tablets in 1 ounce (or more if preferred) of water (slightly warm in preference), stirred up and taken during effervescence.

This gives a 10 grain dose of Bismuth Carbonate.

The preparation has the advantage of the Bismuth Carbonate being in a practically 'nascent' form. It is palatable and the Carbon Dioxide assists as a digestive.

The necessaries have been arranged in a small outfit for use.

Note.—Chemically 10 grains of Bismuth Carbonate are produced by 12 grains of Bismuth Subnitrate and 4 grains of Sodium Bicarbonate, also 10 grains are formed by 20 grains of Bismuth Nitrate (Crystal) and 10 grains of Sodium Bicarbonate—approximately.

Bismuthi Oxidum, $Bi_2O_3=464$.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

Is prepared by boiling bismuth subnitrate in solution of soda, washing and drying the deposited yellowish bismuth oxide. May with advantage be precipitated with acid from an alkaline solution containing glycerin.

Anderson's Ointment.

Bismuth Oxide 1, Oleic Acid 8, White Wax 3, White Soft Paraffin 9. In pruritus.

Bismuthi Oxychloridum, $BiOCl=259·46$.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

A non-irritant cosmetic powder, pearl white or '*blanc de perle.*' Given internally it produces a coating on the irritated parts of the stomach or bowels. As insufflation to the larynx $\frac{1}{4}$ to $\frac{1}{2}$ gr.

An **Oxybromide** is also made, with similar internal use.

Mucilago Bismuthi. **For "X" Ray Diagnosis.**

Bismuth Oxychloride $1\frac{1}{2}$ to 2 or 3 ounces or less made into a thick paste with Acacia Mucilage for a dose, for determining condition of the œsophagus and for examining shape, position and motor function of the stomach. A special Bismuth Oxychloride *free from Nitrate* is made for "X" ray work.

Bismuth in Bread and Milk in proportion of $1\frac{1}{2}$ ounces of Bismuth Oxychloride to $\frac{1}{2}$ pint of bread and milk to form a thick paste—not a liquid—is also employed and is **more suitable for examining the Functions and Shape of the Stomach.**

Bismuth Oxychloride 2 ounces in porridge, in stomach examinations not likely to stick and confuse results.—L. ii./08,735.

Bismuth Oxychloride is the only bismuth salt inert in the stomach. 4 to 6 ounces safe for X-ray work. B.M.J. ii./12, 235; L. ii./13, 1516.

In tuberculous joints injections into sinuses useful for diagnosis and treatment.—B.M.J. ii./09,331.

Two deaths of infants have been reported from the use of the Subnitrate.—B.M J. ii /08,715.

See also Bismuth Carbonate *antea* and Radiology Vol. II.

Pessaries or **Suppositories** may be made with Oil of Theobroma, containing 10 grains (0·6 Gm.).

Unguentum Bismuthi Oxychloridi.

Bismuth Oxychloride 1, Vaselin 15.

Is useful for anointing the speculum for vaginal examinations.

Unguentum Bismuthi Compositum, Plaistow.

Bismuth Oxychloride 2 drachms, Dilute Hydrocyanic Acid 20 minims, White Paraffin Ointment 1 ounce.

The **Oxyiodide** had been applied to ulcerating sores and injected in suspension, 1 in 100 of water for gonorrhœa; also as an ointment for rectal affections. Internally for ulcer of the stomach.

Bismuthi Salicylas, **Bismuth Oxysalicylate, or Subsalicylate** $C_6H_4.OH.COO.BiO=361·075$ (*Off.*). **U.S., Jap., Helv.** (latter with method of making).

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

A white powder, insoluble in water, alcohol, and glycerin, yields on incineration about 64% of Bismuth Oxide. Has been used with advantage in some forms of diarrhœa, typhoid fever and gastric catarrh, and as a substitute for iodoform.

For Notes on Chemical Examination see Vol. II.

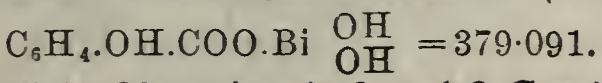
As an intestinal antiseptic Bismuth Salicylate has proved to be the most reliable.—Jl. A. M. A., Nov. 6/10.—per M.A. 1911, 149.

Tablets, 5 grains (0·3 Gm.). *Dose.*—1 to 4.

Suppositories of Bismuth Salicylate, 10 grains.

A useful astringent in dysentery.

Bismuthum Subsalicylicum, Basic (FR. CX.).



$$C_6H_4.OH.COO.Bi\begin{matrix}OH\\OH\end{matrix} = 379·091.$$

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

An amorphous anhydrous insoluble white powder neutral to Litmus, incompatible with Acids. To prepare, warm without boiling Hydrated Bismuth Oxide (*q.v.*) 158 or as much as corresponds to 150 Gm. Bi_2O_3 with Salicylic Acid 100 previously mixed with water 1,000. The mixture should be finally slightly acid. After cooling collect and wash rapidly, and dry at not exceeding 80° C. In an experimental quantity which we prepared we found a distinct proportion of free Salicylic Acid.

Bismuthi et Cerii Salicylas.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

For sickness, diarrhœa, dysentery, and ulceration of the bowels.

Lac Bismuthi et Cerii is sold as a speciality.

Dose.—One to two drachms.

Bismuthi Sulphocarbolas *vel* **Sulphophenas.**

Dose.—4 to 8 grains (0.25 to 0·5 Gm.) in cachets.

A red-tinted slightly soluble powder used in intestinal affections.

Bismuthi Subnitras, BISMUTH OXYNITRATE, MAGISTERIUM BISMUTHI *Off.*, **Ph. Ned.**, P. Helv., $BiONO_3H_2O = 304·026$.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

P. Jap. gives method of making—*i.e.*, Bismuth 1, Nitric Acid (1·2 Sp. Gr.) 5, solve and allow to crystallise, then take the crystals 1, water 4, and add boiling water 21. Pour off, wash with water 25, and dry at 30° C.

Yields (*Off.* and P. Jap.) 79 to 82% Bi_2O_3 (U.S. not less than 79%).

Incompatible with alkaline carbonates, also decomposes Potassium Iodide, and incompatible with Tannin and Sulphur.

Best suspended in aqueous vehicle by Compound Tragacanth Powder. 1 drachm to 8 ounces, or by powdered Gum Acacia. Or may be intimately mixed with Liquid Paraffin. This avoids decomposition into nitrite in the stomach. *c.f.*, Bismuth Carbonate.

Uses.—In gastric ulcer and dysentery as an intestinal antiseptic, and occasionally as a dusting powder in eye work. During the war has been much used to wounds in the form of 'B.I.P.P.'

Gastric ulcer well treated by Bismuth Subnitrate rubbed into a paste with Liquid Paraffin. The Liquid Paraffin is a good vehicle for Bismuth, undoing its constipating effect.—L. J. Picton, B.M.J. ii./17 617.

As a dusting powder for granulating wounds caused poisoning.—L. ii./17.249.

Injectio Bismuthi Subnitratis.—BECK'S BISMUTH PASTE. For 'X' Ray Examination of fistulæ. (*c.f.* also Bismuth Oxychloride).

(*a*) For Diagnosis and Early Treatment.—Bismuth Subnitrate 1 is slowly stirred into hot melted Vaselin 2.

(*b*) For Late Treatment.—Bismuth Subnitrate 6, White Wax 1, Hard Paraffin 1, (M. pt. 120° F.), Vaselin 12. Mix while boiling. Sometimes 1% Formalin is added.

The (*a*) form was originally injected to diagnose the extent of chronic tuberculous sinuses. It was found in addition, however, to have marked curative effect. Injections with a glass syringe are made after melting and mixing. The syringe must be sterilised dry, and the plunger dipped in sterile oil before charging.—Beck, 'Fistulous Tracts, Tuberculous Sinuses and Abscess Cavities.'—Jl. Am. Med. Assoc. 14/3/08, p. 868, *et seq.*

Various modifications have been introduced from time to time, *e.g.*, the following which is in use by London surgeons:—Bismuth Oxychloride 1, Vaselin 1½, Liquid Paraffin 1½, for injection into sinuses.

It is generally believed that Paraffin is not absorbed in the tissues. This applies only to hard paraffin,—that soft Paraffin is absorbed was proved by Kirchner and Eckstein of Berlin, in 1905 and 1906.

By 'X' Ray examination sinuses so injected can be localised. When employed for diagnostic purposes with subsequent immediate operation there is no danger, but large quantities should not be left *in situ*.—B.M.J.E. i./10,4.

Fistula treated by injection of 100 Cc. of (*a*). The Carbonate would be preferable in view of well known toxic effects of Subnitrate.—B.M.J.E. ii./09,44.

Three ounces of (a) injected at the knee, later 4 ounces further caused obvious poisonous effects. Caution necessary when using for diagnostic purposes. —B.M.J. ii./08,1604.

A number of injections of 3 drachms downwards to only 30 or 40 minims in cases of abscess sinus caused complete closing; two cases of tuberculous hip similarly with good result. No anæsthetic required—the injections are usually painless. The orifice of the sinus is to be washed with 95% Alcohol and all water excluded. The action of the Bismuth thought to be bactericidal, chemotactic and astringent. Diminution of number of organisms in sinuses injected has been shown. Mechanical action of the paste is also good. The diseased walls of sinuses are separated and brought in contact with a substance in itself stimulating.—B.M.J.E. ii./10,2. Chronic fistulæ and abscess cavities treated. Results fairly satisfactory.—B.M.J.E. ii./11,2.

A paste of Bismuth Subnitrate 1, with Petrolatum 2, is efficacious in drainage of acute suppurating sinuses but does not assist in rapidity of cure, and should never be used in clean wounds as it retards healing and tends to chronic conditions.—J. Am. M. Ass., 1912, v. 68, pp. 1339—1341.

Pasta Bismuthi et Iodoformi. *Syn.* "B.I.P.P."

Mix Bismuth Subnitrate 1, and Iodoform 2, and stir in Liquid Paraffin 1 or *q.s.* to soft butter or cream consistence, and finally rub down on a slab with a spatula.

The Bismuth Subnitrate and the Iodoform may be sterilised by dry heat at 120° C. for ½ hour. A Paraffin Base of composition: Paraffin melting point 45° C. 19 parts, and Liquid Paraffin (Sp. Gr. 880) 40 parts suggested when making a *soft* "B.I.P.P." — S. Dunstan, B.M.J. ii./17,505.

In dressing a wound (i.) clean the skin and surrounding area with gauze wrung out of 1 in 20 Carbolic Lotion—usually under open ether anæsthesia.

(ii.) Open the wound freely and, if possible, sufficiently to inspect the cavity and cleanse with dry sterile gauze mops, using a Volkmann's Spoon, and remove foreign bodies.

(iii.) Mop out with cotton-wool mops soaked in Methylated Spirit and dry.

(iv.) Fill up with "B.I.P.P." by drawing backwards and forwards through the track of the wound strips of gauze covered with the paste. Remove all excess, leaving only a thin covering over the wounded surface. Dress with sterile gauze and cover with an absorbent pad which is held, if possible, with sticking plaster and bandage. This requires no change for days or weeks if patient is free from pain. If discharge comes through, the stained part must be soaked in spirit and a gauze dressing wrung out of the same applied as a further covering.

(v.) In redressing, the wound is covered with a dossil of wool soaked in spirit and the sticky, dirty-looking discharge is wiped off the surrounding skin until it is clean.

For fresh wounds, when infective gangrene is still a serious possibility, free drainage must be employed. There is little danger of Iodoform poisoning. In 40 cases there was no need to change a dressing sooner than intended. Except in head wounds, no spread of septic infection, no cellulitis nor abscess formation. The method makes possible the healing by first intention under infrequent dressings. Acute abscesses opened, cleaned, filled with "B.I.P.P.," and closed by interrupted sutures can heal by first intention without further pus formation. It appears safe to plate compound fractures by the method described.—Rutherford Morison, L. ii./16,268.

Since the advent of "B.I.P.P." it has been possible to treat large infected wounds in such a way that they require no special drainage, that they can be safely closed by sutures at any period of their progress, and the dressings used for them can be left on from one to six weeks with a knowledge that they are making steady progress. To avoid risk of Bismuth or Iodoform poisoning *smear the surface of the wounds* and rub in "B.I.P.P.," *removing any excess.*

The fresher the wound is the better it reacts to the treatment. Wounds have been closed without tube or other drainage than is allowed for between *interrupted* sutures, not too close together. From these the bacteriologist has cultivated *B. Perfringens*, *Tetanus* and a variety of other anærobic organisms, but the results have always been good.

Thick sterile silk sutures rubbed all over with "B.I.P.P." are better than silkworm-gut.

Compound fractures of all the bones can be treated with as great ease as simple fractures. Cases of compound fracture of ankle, gun-shot and other wounds well reported on. Mastoid surgery revolutionised.—Rutherford Morison, B.M.J. ii./17,503.

This treatment of wounds is the highest achievement.—Sir A. P. Gould, B.M.J. ii./17,677.

It combines a maximum amount of rest to the wound, a persistent storage of inhibitory antiseptic and a minimum amount of attention but is not free from risks.—Sir G. H. Makins—Hunterian Oration B.M.J. i./17,216; L. i./17,252.

For gun-shot wounds well spoken of.—L. G. Anderson, L. ii./16 447; B.M.J. i./17,264; L. i./17,331.

Toxic symptoms with blue line on gums caused by "B.I.P.P." used according to Morison's technique. Importance of the bismuth salt being lead free. Method of testing given.—F. A. Hepworth, L. i./17,573.

Useful both in recent as well as in wounds several days old. No cases presenting signs of Iodoform or Bismuth poisoning.—L. Colledge and H. Drummond, L. ii./17,49.

In bony injuries the method is good. First excise the wound edges if this has not already been done, then remove foreign bodies and loose fragments of bone, dry with gauze, swab out with methylated spirit, dry well and rub in "B.I.P.P." over the surface, pack and cover with gauze. Change the surface gauze the next day. Providing the packing gauze remains dry, it can be left in a week.—E. H. Walker, B.M.J. ii./17,80.

See also "**Wounds.**"—Therapeutic Index.

Enema Bismuthi et Sodii Salicylatis.

Bismuth Subnitrate 3 drachms, Sodium Salicylate 2½ drachms, Psyllium Seed Mucilage to 1 pint.

Colitis, the treatment of, by Revelliod's method (modified).

Empty the bowels by enemata of warm water twice daily for three days—on the fourth day inject the above. Action of the bowels must be discouraged after the injection as the medicament should be retained for two days, if possible, to permit of absorption.

During the injection the patient should lie upon the left side with the pelvis raised 2 or 3 inches. This treatment has of course no effect upon enteritis alone or complicating (? originating) colitis; consequently a modification is necessary.

Pilula Bismutho-Sodii Salicylatis cum Salol.

Syn. COMPOUND BISMUTH PILL.

Dose.—Two immediately after each of 6 consecutive meals, then discontinue for two days and repeat in the same manner.

This pill contains in the centre Bismuth Carbonate 2½ grains, coated thinly with Gelatin and around this is a layer of Sodium Salicylate 2 grains, covered finally with Salol 1½, 2½ or 3 grains, or as desired (*the Salol to be applied pure by means of heat only*).

It has been devised to ensure its reaching the part of the intestine affected by the catarrh. It is coated with acid resisting material and it dissociates on meeting the alkaline intestinal juice. The coating of Salol is varied in thickness according to the distance from the pylorus the physician may determine the beginning of the catarrhal state to be. While 1½ grains of Salol permits the medicaments to reach the junction (approximately) of the upper and middle thirds of the ileum, 4 grains will, in a large proportion of cases, carry the pill through the whole length of the intestines and cause it to be discharged with the fæces. The well-known coating effect of the Bismuth Carbonate on the inflamed mucous surfaces is enhanced by the properties of the Sodium Salicylate. The Bismuth remains *in situ* for from 8–10 days, after which it is expelled as a Sulphide in bluish-black scales which can be found in the stool. *The Salol must be applied evenly without the use of Acid-Soluble or Water-soluble agents.*—Craik Taylor.

Bismuth Subnitrate Tablets, are made 5 and 10 grains.

Ⓟ **Pulvis Bismuthi Compositus.** *Syn.* INSUFFLATIO BISMUTHI ET MORPHINÆ. FERRIER'S SNUFF.

Morphine Hydrochloride 1, Powdered Acacia 60, Bismuth Subnitrate 180.

From 1 to 3 drachms to be used as snuff in 24 hours for catarrh. For acute coryza, add powdered cubebs.

Ⓟ **L. H.** calls Ferrier's Snuff **Pulvis Bismuthi cum Morphina,** and has Pulvis Bismuthi Compositus as an Antidyspeptic Powder (*Dose* 1 drachm) of Bismuth Carbonate, Heavy Magnesium Carbonate, Sodium Bicarbonate, of each 1.

Bismuthi Oxy-Iodogallas. **P. Helv.**

$C_6H_2(OH)_3COOBi.OH.I = 520{\cdot}803$.

Syns. AIROFORM, AIROGEN.

✱AIROL, TRADE MARK 181257 of 1894. Renewed 1908. PATENT 22902 of 1894, ***Expired.***

Manufacture (From Patent specification). Bismuth oxyiodide derived from 9·5 Kilos of Cryst. Bismuth Nitrate is washed and stirred with water. 3·4 Kilos Gallic Acid are added until red colour changes to greyish-green. Collect, wash and dry at moderate heat. Or, Bismuth Gallate (Dermatol) 10 kilos are treated under heating with 3·1 kilos of Hydriodic Acid until of green colour. Wash and dry.

A light greyish-green powder, odourless, non-irritant. An iodoform substitute used as ointment for ulcers, boils, whitlows, chancres, and intertrigo. Also as dusting powder, *e.g.*, for gonorrhœal ophthalmia.

Suppositoria Hæmorrhoidalia.

Bismuth oxyiodogallate 6, Resorcin 1·5, Zinc Oxide 6, Balsam of Peru 1·5, Yellow Beeswax 0·0075, Sesame oil 1·5, Oil of theobroma 19. Divide into twelve suppositories.

A formula of the "Specialities" Committee of the "Nederlandsche Maatschappij ter Bevordering der Pharmacie" 1914.—C.D., July 25, i./14.

Sanusin ✱Semoules (.M. 32[illegible]33) contain Resorcin, Boric Acid, Balsam Peru, Zinc and Bismuth Carbonate—useful in treatment of hæmorrhoids.

Bismuthi Subgallas, $C_6H_2.(OH)_3CO.O.(BiO), H_2O$ or $Bi(OH)_2C_7H_5O_5 = 411{\cdot}091$ *Syn.* ✱DERMATOL; U.S. 52–57% Bi_2O_3. P. JAP. and P. HELV. GALLATE DE BISMUTH. FR. CX. 56·45% Bi_2O_3 (with directions for making).

PATENT 6234 of 1891 became void in the 11th year. Now public property. DERMATOL (T.M. 215949/1899), registration renewed 1912.

According to the Patent specification—Neutral Nitrate of Bismuth 48 is dissolved in dilute Nitric Acid and thereto is added a solution of Gallic Acid 19 in Alcohol 40 (weight) and 20 of water. Caustic alkali or alkali carbonate is added until the whole remains slightly acid. On addition of Sodium Acetate and even on diluting with water precipitation takes place.

Manufacture.—May be prepared according to our investigations in several different ways:—(1) By mixing the freshly precipitated Hydroxide obtained from Bismuth Nitrate (crystal) 484 with Gallic Acid 188 dissolved in warm Alcohol, and warming the mixture until the colour is light yellow and the supernatant liquor is hardly acid. Collect and wash with lukewarm water. (2) By using Bismuth Carbonate 258, Gallic Acid 188, and Water 2,000, heating until interaction has occurred, or (3) By using Bismuth Subnitrate 304 in place of the Carbonate. In this case the Gallic Acid must be used as Sodium salt.

On the whole we find the No. (2) method is best. The colour is lemon yellow and the Bi_2O_3 content we found approximates theory —56·4%.—W. H. M., 1917.

The Fr. Cx. method is also satisfactory: Dissolve Bismuth Nitrate *Cryst.* 100 Gm. in Glacial Acetic Acid 200 Gm. Dilute with water 500 Cc. and add with stirring Gallic Acid 37 dissolved in water 1,500 Cc. Wash the p.p. until the liquor is no longer acid to litmus. Dry at not exceeding 60° C.

Average dose (U.S.)—8 grains (0·5 Gm.).

An odourless, yellow, insoluble, non-irritant antiseptic dusting powder, employed alone or with starch.

Incompatible with alkaline sulphur compounds.

Given internally for diarrhœa in doses of 30 to 90 grains daily. Emulsion of Bismuth Subgallate 2, Gum Acacia 2, Water 25, has been used in gonorrhœa, with good results.

In ulcerative colitis an emulsion to adhere to the mucosa.—B.M.J. i./09,770. May be used freely in situations (*e.g.* the rectum after pile operations) where absorption may occur. Promotes healing.—W. S. Handley.

Collapsubes, with catheter attachment, of **Bismuth Subgallate Ointment,** 10%, with paraffin basis, are useful in gonorrhœa: this ointment is also good for burns and eczema.

Carbassus Bismuthi Subgallatis. Bismuth Subgallate Gauze.

To prepare, use an emulsion of Bismuth Subgallate, ½ to 1 of Glycerin to 2 of Alcohol (90%) and proceed int he customary manner (*c.f.* Sterilised Dressings)—the final strength being 10 to 20% of the Bismuth in the gauze as required.

Useful as an Iodoform Gauze substitute for packing cavities, etc. —L. i./13,1794.

Bismuthi Tannas. *Dose.*—10 to 30 grains (0·6 to 2 Gm.).

A yellow powder insoluble in water, is astringent, and useful in diarrhœa and dysentery. F.N. 1911 and P. Hung. give method of making.

Bismutose (*c.f.* German patent 117269). *Dose.*—15 to 30 grains for children, adults by the teaspoonful. A compound containing about 20% of bismuth with 60% of albumen; useful in gastric ailments.

Naphthol-Bismuth. Basic Bismuth Beta-Naphtholate.

$Bi_2O_2(OH)C_{10}H_7O=608{\cdot}114$.

Syn. ✱Orphol. Trade Mark 190732/1896. Renewed 1909.

Patent 13291/1892 and 15361/1894. The first remained in force the entire period. The second became void in the 7th year. Now public property. U.S. Patent is 516358/1894.

Dose.—10 to 30 grains (0·6 to 2 Gm.).

Manufacture.—One of the patent examples speaks of the use of Beta Naphthol 14·5 kilos, Caustic Soda 4 kilos, and Bismuth Nitrate 12 kilos on the lines of the Xeroform patent. The method does not give satisfaction.

We have made a compound of this kind by interaction of a Sodium Naphtholate solution made with Beta Naphthol 144 (one molecule) and Sodium Hydrate 120 (3 molecules) with Bismuth Citrate 397 (one molecule) in the form of a paste with water. The author originated the idea of the process by analogy with his work on Tri-brom-phenol Bismuth.

This method produces a light buff coloured powder, which gave on ignition approx. 80% Bismuth Oxide. Theory demands 76·3%.

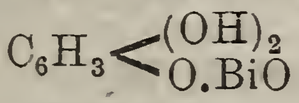
A useful antiseptic to the stomach and intestines, astringent.

Phenol-Bismuth.

$Bi(OH)_2C_6H_5O = 335·086$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

A greyish powder, insoluble, containing about 20% of phenol, combined with bismuth oxide. Acts slowly on the digestive tract and does not cause carboluria. Has a similar action to last preparation.

Pyrogallol - Bismuth.  $C_6H_3<^{(OH)_2}_{O.BiO}$ or

$C_6H_3(OH)O_2BiOH = 349·070$ has internal action similar to Salol.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

Bismuthi Tartras Solubilis, wrongly so-called, is actually **Bismuth-Sodium Tartrate.** *Dose.*—2 to 5 grains (**0.12 to 0·3 Gm.**).

A white powder, or more usually in scales, readily soluble in all proportions in water with slightly acid reaction. It yields (by experiment) about 63% Ash, *i.e.*, 50% Bismuth Oxide and about 13% Sodium Carbonate.

Chemically and physiologically compatible in moderate amount with Pepsin (*vide* Vol. II.).

A solution corresponding to the official Liquor Bismuthi so far as Bismuth content is concerned is produced by dissolving 185 grains (12 Gm.) in Distilled Water, *q.s.*, to 3½ ounces (100 Cc.).

Liquor Bismuthi Tartratis.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Dissolve Bismuth Tartrate Scales 1040 grains in Water 10 ounces, and Chloroform 20 minims in Alcohol 40 minims, mix and make up to 20 ounces.—T. D. Morson and J. Harpham, C.D. ii./12,947.

Bismuthi Tartras.—$Bi_2(C_4H_4O_6)_3 + 6H_2O = 968·252$. An insoluble white powder. The previous compound is more in use.

✶ **Krebisote** (T.M. 306503). Probable approximate composition $C_6H_3(CH_3)(OCH_3)O.Bi(OH)_2$.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**).

Greenish yellow or brown powder darkening on exposure to light and air Yields 60-63% Bismuth Oxide on ignition. A definite compound of Creosote and Bismuth. It is completely soluble in Chloroform. When treated with weak Hydrochloric Acid at body temperature, it is decomposed and Creosote is liberated.

An Iodoform substitute, also as remedy in ointment form in eczema and as prophylactic against dysentery. The two component parts—the Creosote and the Bismuth acting together are thought to have distinct advantage.

BOUGIES.

Urethral Bougies. These are, *firstly*, of gelatin basis in *two* lengths, namely, 2½ inches and 4 inches, and are directed to be dipped in warm water prior to insertion. For various contents, *see* Index. (U.S. requires 7 Cm. = 2¾ inches, weighing about 2 Gm., and 14 Cm = 5½ inches, weighing about 4 Gm. respectively.) *Secondly*, of Cacao Butter of *any* length up to 6 inches if desired, and of six sizes, with the following diameters :—No. 1, $\frac{1}{8}$ inch ; No. 2, $\frac{5}{32}$ inch ; No. 3, $\frac{3}{16}$ inch; No. 4, $\frac{7}{32}$ inch ; No. 5, $\frac{1}{4}$ inch : No. 6, $\frac{5}{16}$ inch. These are for the treatment of gonorrhœa in its various stages. Those of Cotarnine (*q.v.*) are used to check bleeding.

The **U.S. Urethral Bougies** made with Oil of Theobroma are 7 Cm. and 14 Cm. long and weigh about 1 and 2 Gm. respectively.

Nasal Bougies are termed **Buginaria.** These are of elastic gelatin basis 3 $\frac{3}{16}$ inches in length and are medicated with **Boric Acid, Carbolic Acid, Copper Sulphate and Zinc Sulphate.** For strengths, *see* Index.

Nasal Bougie Mass.—Gelatin 15, Water 13, Glycerin 18 (weight)

BROMUM.

Br=79·92.

A dark brown liquid, Sp. Gr. 2·99, with penetrating odour Soluble 1 in 30 of water. Is not used as such medicinally.

Manufacture and Source of Supply.—Prior to the war supplies were derived from Germany and U.S.A. Since the war Bromine has been made in large quantities in France from sea water.

Glass Capsules, 1, 2·2, and 4 Cc. and *Liquor Bromi, Vol. II.*

Magnesii Bromidum $MgBr_2+6H_2O$=292·256.

Contains 54·9% of Bromine, given in *doses* of 10 to 20 grains (0·6 to 1·2 Gm.) for hysteria and epilepsy as a nervine sedative. Soluble 1 in 0.6 of water and 1 in 2 of alcohol 90%.

Manganesii Bromidum $MnBr_2+4H_2O$=286·834.

Contains 55·7% of Bromine, and is given in *doses* of 1 to 3 grains (0·06 to 0·2 Gm.) as a nervine tonic. It is soluble 1 in less than 1 of water and alcohol. Both of these may contain less water of crystallisation

Calcii Bromidum. U.S. $CaBr_2$=199·91.

Dose.—10 to 20 grains (0·6 to 1·2 Gm.).

A white crystalline powder soluble 1 in 0·3 of water and about 1 in 0·6 of alcohol 90%. Has been given in epilepsy with good results.

Flavoring.—Syl or Glyl Menthæ Piperitæ, Syl Limonis (bold dose), Syrupus Aromaticus.

Frequency and intensity of fits is diminished by Calcium Bromide —effective in half the dose of Potassium Bromide. Mental activity increases and general health improves. Effect marked if patient previously on Potassium Bromide.—A. Humphrey Davy.—B.M.J. ii./15,692.

A. G. Auld points out the relative content of Bromine in the two salts. The effect is nevertheless, in his opinion, due to the calcium.—*ibid*, p. 765 ; see also C. A. Mercier, *ibid*, p. 876 ; W. A. Turner and J. A. W. Pareira, *ibid*, 909.

'Urea-Bromine' $[CaBr_2, 4CO(NH_2)_2]$=343·982.

Dose.—4 to 15 grains (0·25 to 1 Gm.).

Caution.—The name Urea Bromide has been loosely applied to Barbitone, q.v.

A combination of Calcium Bromide and Urea containing 36% Bromine. During the prolonged administration of a course of

Bromide there is apt to be a severe strain on the excretory organs, especially skin and kidneys, and hence the heart may suffer. Urea is a marked diuretic. Acne-form eruption due to Bromism disappeared under the use of this combination; it also improved the heart's action.—B.M.J.E. ii./11,63.

Bromal Hydras. $CBr_3.COH.H_2O=298{\cdot}794$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) at bedtime.

In large colourless crystals, which melt on the hand, soluble in water 1 in 2½. Applied externally it irritates the skin. It has been tried in epilepsy, chorea and insomnia.

✱**Bromalin** (T.M. 230304).—*Syn.* Bromethylformine, Hexamethylentetraminbromethylate, Hexamine Ethyl Bromide. $(CH_2)_6N_4C_2H_5Br = 249{\cdot}136$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**) in cachet or mixture.

In crystalline powder or scales, soluble 1 in 0·6 of water, and about 1 in 25 of alcohol 90%. A sedative in neurasthenia and epilepsy.

Brominoleum, Brominol (33%).—*Martindale.*

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**) approximately equivalent in content of Bromine to 5 to 30 grains Potassium Bromide.

An additive compound of Bromine and Sesame Oil, containing 33⅓% of the halogen in form of a thick yellow odourless oil, Sp. Gr 1·31 Gradually liberates bromine to the system.

Uses.—In epilepsy and all forms of nerve troubles, also in headache and sea-sickness. May also be rubbed into the skin if diluted with an equal weight of Lanolin Ointment.

It may be taken internally shaken up with an equal volume of syrup, in beer, wine or milk, or dispensed as follows: Brominol 33% 2 ounces, Gum Acacia 1 ounce, Chloroform 18 drops, rub together and add quickly with vigorous agitation Water *q.s.* to 6 ounces. *Dose.*—2 drachms equal 20 grains Potassium Bromide.

A weaker **Brominol** containing 10% of Bromine is also prepared. Sp. Gr. 1·008. A dose of ¼ ounce of this equals approximately 20 grains of Potassium Bromide.

Capsules contain 2 Gm. of 33% Brominol in each equivalent to (**1 Gm.**) 15 grains Potassium Bromide.

Ⓟ **Mistura Brominol cum Nuce Vomica.** Brominol 30 grains, Gum Acacia 30 grains, Tincture of Nux Vomica 6 minims, Spirit of Chloroform 15 minims, Water to ½ an ounce. For one average dose.

The urine from patients under Brominol treatment contains an appreciable quantity of Bromine in combination, and the fæces contain traces.—W. H. M.

Brominol Tablets are prepared, each equivalent to 9 grains of Potassium Bromide.

Brom-Albumen. *Syn.* Bromo-Protein.

Dose.—10 grains (**0·6 Gm.**)=¾ grain Bromine approx.—increased as desired.

A preparation containing 7% Bromine in organic combination with albumen, made by interaction of Bromine with Egg Albumen, in form of a light brown powder. Used as substitute for Alkaline Bromides in epilepsy, where considerably larger doses than the above, may be required. It is hardly soluble in 0·2% Hydrochloric Acid, even in presence of pepsin, but is readily dissolved in 0·5% Sodium Bicarbonate in the presence of Pancreatin, hence it is assumed that digestion and absorption takes place in the intestines.

Bromogluten.

Dose.—10 grains (**0·6 Gm.**)=$\frac{4}{5}$ grain Bromine approx.—increased as desired.

A preparation made on lines analogous with **Iodogluten**, *q.v.* Edn., XVI., p. 462, a powder containing about 8% Bromine. To replace Alkaline Bromides as nervine sedative, *e.g.*, in headache and in epilepsy. Has mild hypnotic properties. The Bromine is absorbed by the alkaline juices of the intestines.

✱ **Sedobrol** (T.M. 347485) **Tablets** weigh 2 Gm., and contain 1·1 to 1·2 Gm. of Sodium Bromide and 0·1 Gm. Sodium Chloride, in addition to vegetable extractives and fat. Suggested for a salt-free Bromide Treatment or diet—the tablet being simply covered with 100 to 200 Cc. of hot water to produce a bouillon for use in nervous affections, epilepsy and migraine.
Dose.—1 to 3 tablets *pro die.*

Bromoform, **U.S., P. Helv., Fr. Cx., Ph. Ital.** $CHBr_3$=252·773.

Dose.—½ to 2 minims (**0·03 to 0·12 Cc.**) or more. P.G.V. and Fr. Cx. maximum single dose 0·5 Gm.; max. during 24 hours 1½ Gm. (=8 minims approx.). Children as many drops as years old—up to 6.

A limpid, colourless, sweet liquid, with an agreeable odour; Sp. Gr. 2·829 to 2·833. B.pt. 148° C. Soluble in alcohol 90% in all proportions, slightly in water, decomposed by light. It should be preserved by addition of 0·5 to 1% alcohol. Is a powerful sedative, useful in insane cases. **Capsules** contain ½ minim (**0·03 Cc.**) dissolved in oil.

Aqua Bromoformi. Well shaken, 1 minim is dissolved in 2 ounces of water. *Dose.*—1 to 4 ounces (**30 to 120 Cc.**).

For sea-sickness half doses occasionally.

Emulsio Bromoformi. *Dose.*—2 to 4 drachms (**8 to 15 Cc.**).

Bromoform ½ (fluid) drachm, tincture of senega ½ ounce, shake well and gradually add water *q.s.* to 5½ ounces, syrup of orange ½ ounce. Makes a good emulsion but not agreeable in taste. *c.f.* Syrupus Bromoformi—*infra.*

Soluté Officinal de Bromoforme, Fr. Cx.

Maximum single dose 8 minims; *maximum during* 24 hours 4 drachms approximately.
Bromoform 1, Glycerin 3, Alcohol 90% 6, all by weight.

Syrupus Bromoformi.—*Martindale.* *Dose.*—¼ to 1 ounce (**8 to 30 Cc.**)=½ to 2 minims of Bromoform.

Bromoform 2 minims, Alcohol 90%, 80 minims, Syrup 160 minims, Glycerin ½ ounce.

This, we found after a number of trials, to be the only practical formula for a preparation of moderate alcohol strength, suitable for children—but even this is pungent by reason of the bromoform and may be diluted at time of taking. The Soluté of the French Codex cannot be taken without diluting and the Emulsio is not agreeable.

Uses.—In whooping cough diminishes number, duration, and severity of attacks, and mucous secretion is more easily got rid of.

Poisonous effects from Bromoform.—L. ii./98,1816; i./99,119; B.M.J. i./01,1202.

P1 ✱**Rami** (T.M. 245697) **Syrup.** *Dose.*—Adult, 1 tablespoonful 3 to 5 times a day; Children over 5, 1 teaspoonful 3 to 5 times daily. Children under 5, 15 minims diluted every hour or ½ hour according to age

Contains "per (tablespoon) dose," Alcoolature d'Aconit 3 drops, Codeine 0·01 Gm., Bromoform 2 drops, Tolu 0·05 Gm.

Brometone. TRI-BROM-TERTIARY BUTYL ALCOHOL.

$C_4H_7OBr_3$=310·836. *Dose.*—5 grains (0·3 Gm.), repeated 2 or 3 times during 24 hours.

White crystals melting at 167° C. containing about 77% bromine. ***Soluble*** in alcohol, slightly in cold water.

Uses.—Hypnotic, analgesic, antiseptic. Useful in sea-sickness.

Capsules of Brometone, 5 grains in each.

In epilepsy, in some cases, of value and has some hypnotic power.

Large doses may produce dizziness, loss of appetite, and mental heaviness.—H.

✱**Bromoglidine** (T.M. 308517) **Tablets** 8 grains (**0·5 Gm.**). Contain 10% Bromine.

For use in epilepsy, hysteria, neuralgia and neurasthenia.

The Bromine is excreted in the urine, extremely slowly. (Iodine, on the other hand, is not stored up in the organism even when given in large quantity).—B.M.J.E. i./09,28.

For a résumé on Organic Bromine Compounds with comparison of the quantity of Bromine in daily doses *vide Vol II.*

BUCHU. (*Off.*)

The dried leaves of *Barosma betulina* (*Rutaceæ*) contain volatile oil and mucilage. Carminative and diuretic. Buchu has antiseptic action in irritability of bladder and for gonorrhœa. The **infusion** (1 in 20 boiling water) is representative of the activity of the drug. *Dose.*—1 to 2 ounces.

Flavoring.—Syl Aurantii Floris, Syl Lavandulæ; Syrupus Aromaticus.

Tincture (*Off.*) 1 in alcohol 60% 5. *Dose.*—½ to 1 drachm.

Fluidextractum Buchu, U.S.

Average dose.—30 minims. 1=1 hydro-alcoholic percolate.

B. Venusta and *B. Pulchella* are unofficial varieties which have been on the market. The former on crushing is first pungent and acrid, later anise and fœnugreek-like. Pulchella has Citronella odour.—C.D. ii./07,702 and i./11,854.

BUTYL-CHLORAL HYDRAS. (*Off.*).

Syn. CROTON-CHLORAL HYDRATE (formerly so-called), TRICHLOR-BUTYLIDENE GLYCOL.

$CH_3.CHCl.CCl_2,CH\ (OH)_2$=193·456.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**), in pills or cachets.

Antidotes.—Stomach tube, emetic, coffee, caffeine, atropine.

This body is produced by the addition of water to liquid Butyl Chloral which is the final product of the action of Chlorine on Aldehyde. In pearly-white crystalline scales with pungent odour resembling that of Chloral Hydrate, and an acrid, nauseous taste. ***Soluble***

1 in 43 of cold water; freely in alcohol, 1 in 1 of glycerin, and olive oil 1 in 20.

Incompatible with alcohol. Butyl-Chloral Alcoholate will be formed, and in case of some mixtures will be precipitated.

Menthol 2, with Butyl Chloral Hydrate 1 part, liquefy. Combines also with Phenazone, *q.v.*

Flavoring.—Syl Menthæ Piperitæ; Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

May be administered in mixtures with syrup or as—

Mistura Butyl-Chloral.

Butyl-Chloral Hydrate 4 grains, Glycerin 15 minims, Water to 1 ounce. This is useful as an anodyne in neuralgic affections of the throat, frequently repeated.

In combination with phenazone, cannabis, or gelsemium, Butyl-Chloral is useful in migraine; neuralgia of nerves other than the cranial rarely benefited.

Pilula Butyl-Chloral. 3 grains (0·2 Gm.) or more.

Dose.—1 every 2 hours, or hourly.

Ⓟ **Pilula Butyl-Chloral cum Gelseminina.**—NEURALGIC PILLS.

Gelseminine Hydrochloride $\frac{1}{200}$ grain (0·0003 Gm.) is added each of the above. Ⓟ Tablets are also prepared.

For facial neuralgia two at the outset followed by one hourly until six have been taken.

Ⓟ **Pilula Butyl-Chloral cum Camphora et Gelsemio.**

Butyl Chloral Hydrate 2 grains, Camphor 1 grain, Alcoholic Extract of Gelsemium $\frac{1}{4}$ grain, Powdered Acacia Gum $\frac{1}{4}$ grain, Powdered Tragacanth $\frac{1}{4}$ grain, Powdered Liquorice Root 1 grain, Syrup *q.s.* Varnish. Use similar to the last mentioned.

Chloretone. *Syn.* **Chlorbutol; Trichlor-Tertiary-Butyl-Alcohol**
$CCl_3.(CH_3)_2C.OH = 177{\cdot}456$.

Dose.—5 to 24 grains (0·3 to 1·5 Gm.) in cachet, capsule, or tablet followed by a draught of water or milk, or suspended in a mixture.

Manufacture. This compound was discovered by Willgerodt in 1886, see Ber. 19 (1886), 2455. It is prepared by adding Potash to a mixture of Chloroform and Acetone.

White crystals, with camphoraceous taste, melting at 80° C. It volatilises with heat. *Soluble* 1 in 200 of water (solutions should be made as required), 1 in 10 of glycerin, 3 in 2 of alcohol 90%, 1 in 50 of Liquid Paraffin, 1 in 12 of Olive Oil.

Uses.—Local anæsthetic and antiseptic and slightly hypnotic. Acts particularly on the stomach. *Solutions* in liquid paraffin 1 to 2% have been used for inflammation of the middle ear.

Vaginal pruritus has been treated with a warm douche 0·4%.

For piles, 5 grains in a 30 grain suppository; for a dusting powder for wounds and scalds use Chloretone 23, with Zinc Oxide 120, and French Chalk 90 parts. 10% may be added to Linimentum Calcis for burns.

Chloretone Inhalant.—Contains Chloretone 1%, Camphor, Menthol and Oil of Cinnamon in Liquid Paraffin for use in rhinitis, bronchitis, nasal catarrh and 'sore throats.'

Capsules 5 grains check sea-sickness and other vomiting and useful in chorea.

Post-operative vomiting and shock prevented. Value proved by 15 grains in a cachet where time permitted, to every adult operated on 1½ hours beforehand. Spinal Injection of Cocaine in Chloretone Saturated Solution has to our knowledge (Bickle, Adelaide) been conducted without vomiting occurring. See also Ther. Gaz U.S.A , Oct., 1902.

Tetanus successfully treated by Chloretone in dose varying between 30 and 120 grains per rectum in Olive Oil, and Antitetanic Serum. The Chloretone injections reduced rigidity of the jaw.—B.M.J. ii./10,1402.

Chloretone overdosage. Effects after use as sea-sickness remedy included incoordination, fulness in the head, lack of spirits. Should be given either in solution or limited to 10 grains daily with intermissions when extended over several days. Satisfactory when given in Oil or Paraffin or in Cachet when taken with moderation.—L. i./13,1375.

Semi-coma in a woman who took 30 grains for toothache has been observed. Undoubtedly a useful drug in the treatment of many conditions, but its action requires careful and constant supervision. The explanation of toxic effect is, that there is accumulation of the insoluble drug in the alimentary canal followed by sudden absorption of large quantities when any substance capable of absorbing it is taken by the mouth.—L. i./13,1557.

Chloretone Gauze, Sterilised, moist, is prepared in one square yard and 5 square yards in glass jars.

Dentalone is chloretone dissolved in essential oils. Dental analgesic and antiseptic. In toothache the following drops have been found useful : Chloretone 2, Camphor 2, Cinnamon Tincture 0·5, Cajuput Oil 5.—M. 1908,109.

CAFFEINA.

Caffeine (*Off.*). **P. G. V., Ph Ned.** FR. CX. *Syn.* THEINE, GUARANINE. $C_8H_{10}N_4O_2,H_2O=212{\cdot}176$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more—as much as 18 grains being recommended—given in solution, or in pills.

A crystalline alkaloid (M. pt. about 235 to 237° C., usually obtained from the dried leaves of *Camellia Thea*, or dried coffee-seeds—*Coffea arabica*; also contained in Guarana (*q.v.*) and in Maté—the leaves of *Ilex paraguayensis*—also kola nuts—the seeds of *Cola acuminata*, growing in Western Africa ; it is identical with Theine and Guaranine. Caffeine and Theobromine (*q.v.*) can be prepared from Xanthine $\left\{\begin{matrix}\mathrm{NH.CH{:}C.NH}\\ \mathrm{CO.NH.C{:}N}\end{matrix}\right\}\mathrm{CO}$ (Theobromine being di- and Caffeine tri-methyl-xanthine). These are Purin derivatives (*q.v. Vol. II.*). Chemically Caffeine and Theobromine are also **Ureides,** but cannot be deemed poisonous, *c.f.* **Ureides**). ***Soluble,*** 1 in 80 of water, about 1 in 40 in alcohol, less in ether ; acids render it more soluble in water, but it is a feeble base, and on concentrating the solution of the salts they are apt to split up, and the caffeine crystallises out by itself. Is rendered soluble in less water by the addition of an equal quantity of Phenazone. See also Caffeine-Sodio-Salicylate, *etc.*

Cup of Coffee.—The Caffeine in tea is in the form of Caffeine Tannate which is precipitated by the gastric juice and, therefore, the Caffeine is probably not absorbed until it reaches the alkaline alimentary tract.

In the case of coffee, however, in whatever form the Caffeine may be present it is soluble in both alkaline and acid fluids and, therefore, the absorption in this case is probably in the stomach, hence the more prompt action as restorative.

Roasting the coffee diminishes the amount of Caffetannic Acid. Infusion of raw coffee contains 9·6%, pale roasted 6·6%, and high roasted 3·7% approx. *Pyridin* is present in Coffee in small quantity. Coffee often relieves asthma,—while Pyridin is advised as useful in asthma.—L.ii /13,1563.

Antidotes.—Stomach-pump and emetics. Nitroglycerin also apomorphine $\frac{1}{12}$ grain are of value. Poisoning by 60 grains of citrate caused burning in throat, giddiness, violent vomiting, purging and diuresis, tremors of extremities; pain in stomach and bowels, and great thirst.

Uses.—In heart affections (*e.g.*, cardiac failure in pneumonia but its power as a cardiac stimulant is doubted), nervous headache, dropsy (of value in renal dropsy), stomachic (lessens metabolism). It wards off fatigue. Also given in diarrhœa. Subcutaneously in rheumatic affections with Sodium Salicylate *q.v.* Locally, to the eye, it dilates the pupil.

Bronchial asthma of adults is relieved by 2 to 5 grain doses of the Citrate before bedtime and again during the night is useful.—Yeo.

Neuralgic Powders. Caffeine 1 grain, Quinine Hydrochloride 5 grains, Phenazone 10 grains.

For Migraine.—Caffeine 1, Quinine Hydrochloride 2, Salipyrin 1 grains; or—Caffeine 2, Citric Acid 1, Phenazone 15 grains: or—Caffeine 1, Phenacetin 8, Salipyrin 8 grains.—M P.C., July 21/09,67.

Chlorosis.—Haldane and Lorrain Smith showed that in chlorosis, though the percentage of hæmoglobin in the blood is so much diminished, the total amount of hæmoglobin in the body is fully up to the normal Anæmia is only relative; it is due to excess of plasma, not to deficiency of hæmoglobin—*ergo* diminish the fluid of the blood and prevent reaccumulation. Caffeine in conjunction with Digitalis should be used. Magnesium Sulphate is useful for the bowels, and Zinc Sulphate has been tried by emesis. Intake of liquids must be limited, and as little salt must be taken as possible.—B.M.J. ii./09,1668.

For Estimation of Caffeine in presence of Acetanilide see Vol. II.

Elixir Caffeinæ—*Martindale.*

Dose.—1 to 2 drachms (=1 to 2 grains of Caffeine). Caffeine 17·5, Diluted Hydrobromic Acid 4, Simple Elixir (B.P.C. 1894) to 1,000.

Ⓟ Elixir Antineuralgicum.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Phenazone 50, Caffeine 30, Cocaine Hydrochloride 1, Cochineal Tincture 6, Elixir of Orange 25, Alcohol (75%) to 1,000. Has been used on the Continent for headache.—Ph. Notes.

Caffeinæ Citras. $C_8H_{10}N_4O_2.C_3H_4(OH)(COOH)_3=376{\cdot}254$.

CAFFEINA CITRATA (*Off.*), U.S. (No formula.)

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

Treat caffeine 1 and citric acid 1 in a small quantity of distilled water, and evaporate to dryness on a water bath.

Soluble—1 in 32 water, 1 in 25 alcohol (90%).

The alkaloid is loosely combined with the acid, which latter may be volumetrically determined with standard Alkali, using Phenolphthalein as indicator.—Ph.

Incompatible with Potassium Iodide and Spiritus Ætheris Nitrosi, Iodine being liberated. But the following according to our experiments does not darken :—Potassium Iodide 5 grains, Caffeine base 2½ grains, Spiritus Ætheris Nitrosi (neutralised with Ammonium Carbonate) 30 minims, Water to 1 ounce.

Also incompatible with Sodium Salicylate. A little Sal Volatile or Sodium Hydroxide will prevent the Salicylic Acid being thrown out —or use half the Citrate as Caffeine Base.—P.J. i./07,529.

Flavoring—Glyl or Syl Vanillæ, Glyl Sassafras, Glyl or Syl Lavandulæ; Syrupus Aurantii Floris.

Uses.—See Caffeine.

Caffeinæ Citras Effervescens. (*Off.*). Contains 4% of the Citrate, or about 2½ grains in a drachm, as in B.P. '98. U.S. EFFERVESCENT CITRATED CAFFEINE (not less than 1·9% anhydrous caffeine). *Dose.*—1 to 2 drachms.

'Vescettes' of Caffeine Citrate.

Each equivalent to 60 grains of the above, and containing about 2½ grains of caffeine citrate.

Effervescent Caffeine (*Base*), 3 grains in 1 drachm.

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

This, though somewhat bitter, forms a palatable mode of giving a moderately large dose. For migraine the preparation is invaluable.

'Vescettes' of Caffeine (*Base*), contain 3 grains.

Effervescent Caffeine Citrate with Potassium Bromide, has in addition 5 grains of the latter salt to the drachm. For headache.

Tabellæ Caffeinæ Citratis contain 1 grain in chocolate basis, are agreeable to the taste. **Tablets**, contain 2 grains (**0·12 Gm.**).

Tablets of Caffeine 1 grain (**0·06 Gm.**), with **Phenazone** 3 grains; also prepared with **Phenacetin** 4 grains. *Dose.*—1 to 5.

Caffeine Hydrobromide, $C_8H_{10}N_4O_2$, HBr, $2H_2O = 311{\cdot}12$. *Soluble* 1 in 50 approx. **Hydrochloride** $C_8H_{10}N_4O_2$, HCl $2H_2O = 266{\cdot}66$ and **Hydriodide** (unstable).

Dose of each.—½ to 5 grains (**0·03 to 0·3 Gm.**) or more. In transparent crystals.

Tablets contain 2 grains each of the Hydrobromide.

Effervescent Caffeine Hydrobromide is prepared containing 4% or about 2½ grains in a drachm.

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

Caffeinæ Salicylas. $C_8H_{10}N_4O_2.C_6H_4OH.COOH = 332{\cdot}243$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline powder soluble in water.

Caffeine is very soluble in aqueous solutions of benzoate, cinnamate, and salicylate of sodium. These dissolve it in chemically equivalent quantities :—

Caffeinæ Sodio-Salicylas.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) hypodermically, or *per os*. Max. single dose *per os*, 1 Gm. or in 24 hours, 3 Gm.

Evaporate to dryness Caffeine 50, Sodium Salicylate 60, Water 200.

A white amorphous powder, containing 43·8% of caffeine, and soluble 1 in 2 of water. This salt and the corresponding cinnamate and benzoate act like digitalis, but more rapidly.

Caffeinæ Sodio-Benzoas. P. Jap.

Dose.—As for the Sodio - Salicylate. Contains approx. 40% Caffeine.

Injectio Caffeinæ Hypodermica.

Caffeine 20 grains, Sodium Salicylate 17½ grains, Distilled Water to 1 drachm. *Dose.*—1 to 6 minims, contains 1 grain in 3 minims. Unirritating—recommended for alcoholic and morphine intoxication, also for hemicrania. Recommended in rheumatism.—M.A. 1906,428.

The addition of camphor as preservative for this injection is suggested. Thus to 3 Cc. of pure sterile glycerin add a solution of caffeine and sodium salicylate of each 0·25 Gm. in water 1 Cc. ; then add spirit of camphor (10%) 1 Gm. or 1·25 Cc. ; 5 Cc. contain caffeine 0·25 Gm. and camphor 0·1 Gm.—C D. i./06,163.

Hypodermic Tablets contain Caffeine Sodio-Salicylate ½ grain (0·03 Gm.). **Sterules** Hypodermic 1 grain (0·06 Gm.) and 2 grains (0·12 Gm.)

Iritis of rheumatic origin well treated by injection into the median cephalic vein of Caffeine 0·05 Gm. with Sodium Salicylate 0·5 Gm.—Semaine Médicale, 1906, No. 13. p. 147.

Caffeinæ Tri-iodidum, **Caffeine Di-iodo-hydriodide.**

$C_8H_{10}N_4O_2HI,\ I_2 + 1\frac{1}{2}\ H_2O = 602{\cdot}95.$

Dose.—2 to 4 grains (0·12 to 0·25 Gm.).

In prismatic black iridescent crystals, rich in iodine.

Has been used with success in rheumatism and gout.

Assay.—The two loosely combined Iodine atoms can be estimated by titration with standard thiosulphate solution and should equal about 43% The total iodine is 63% approx.

P1 **Pilula Caffeinæ Triiodidi Composita** (*Billimoria*).

Dose.—One early in the morning, one about 3 or 4 p.m., and one at bedtime with water, to be lessened to two or one a day as feeling better.

Caffeine Tri-iodide 2 grains, Arsamin ¼ to 1/3 grain, Valerianic Acid 2 minims, Green Extract of Belladonna 1/6 to 1/3 grain, Jalap Extract, *q.s.* (if constipated), Reduced Iron 1 grain (in asthma only). For one pill or Gelatin Capsule.

Asthma has been well treated with this compound by R. B. Billimoria (Bombay). The majority of the cases in India have not the usual book type "attacks," but dyspnœa every night for days and days, while during the day the patient may be fairly comfortable or again the dyspnœa may be slight or worse.

Whooping Cough even in infants, with proportionately smaller doses has likewise been well treated by this preparation.

Eupnine. *Dose.*—1 drachm before meals up to 4 drachms daily. A specialty containing caffeine and iodine. In asthma, emphysema, and arteriosclerosis.

Caffeinæ Valerianas. $C_8H_{10}N_4O_2.C_5H_{10}O_2 = 226{\cdot}265.$

Dose.—½ to 3 grains (0·03 to 0·2 Gm.). In irregular crystals or powder, of somewhat variable constitution. It controls hysterical symptoms, and is useful in pertussis.

Caffeine-Chloral.

Small white granular crystals, freely soluble in water, with the taste of chloral. Is analgesic and laxative, and in hypodermic injections of 3 to 8 grains useful in constipation, painful gastric distension, sciatica, and rheumatism.

Iodo-Caffeine.—*Syn.* SODIUM-CAFFEINE IODIDE.

Dose.—2 to 10 grains (0·12 to 0·6 Gm.).

A white powder, slightly soluble in cold, freely in water at 100° F. Contains 65% of caffeine. Is a good diuretic, especially to prolong diastole in cases of enfeebled heart. Is useful in cardiac dropsy, and pleurisy with effusion. Said not to disorder digestion.

Antipyrin Coffeino-citricum.—*Syn.* ✱MIGRAININE (T.M. 73257), **P. Austr.** and **P. Helv.** *Dose.*—8 to 15 grains (0·5 to 1 Gm.).

Contains 9% of Caffeine, 1% Citric Acid, and 90% of Phenazone; is of crystalline appearance, easily soluble in water, with a slightly acid reaction.

Incompatibles as Phenazone *q.v.* Is serviceable in headache, but apt to cause sleeplessness.

Migralgin. *Martindale.* *Dose.*—8 to 15 grains (0·5 to 1 Gm.)

Phenazone 88, Caffeine 9, Salicylic Acid 3: the ingredients are fused together. **Tablets** 8 and 15 grains each.

Has been used with success by sufferers from headache.

Rapidly relieve attacks developing.—B.M.J. i./09,1403.

Hydroxy-Caffeine. 1—3—7—TRIMETHYL-URIC ACID.

Dose.—1 to 5 grains or more (?).

Prepared by acting on chloro-caffeine with alcoholic potash, and then treating the ethoxy-caffeine so formed with boiling hydrochloric acid.

Fine needle crystals melting about 345° C. Readily soluble in warm water In large dose powerful non-toxic diuretic. Solutions for use are made thus—Hydroxy-Caffeine 1. Sodium Benzoate 1, Water to 20.—F.N. 1909.

Oxyquinotheine Cachets—Dr. Faivre's.

According to analysis by C. Mannich and L. Schewedes in a German Journal these are said each to contain Caffeine 0·3 Gm., Pyramidon 0·15 Gm., Quinine Sulphate 0·135 Gm., Magnesia 0·04 Gm.—Copied from P.J. i./13,891. For which we take no legal responsibility.

Kola.

Dose.—10 to 20 grains (0·6 to 1·2 Gm.). Seeds of *Cola vera* contain about 2½% Caffeine, also in *C acuminata* (not so much) (*Sterculiaceæ*). Description of, and uses.—B.M.J. i./90,969.

Umney found between 1·1 and 1·3% Alkaloids.—C.D. ii./09,580.

Extractum Kolæ Liquidum. B.P.C. *Dose.*—10 to 20 minims. Kola nuts in 40 powder exhausted with 60% alcohol; 1=1.

FR. CX. standardises to 1·25% Caffeine, but the method of manufacture is stated to be impracticable.

The administration of Kola, Coca and Arsenic flavoured with a little Elixir of Orange forms a useful tonic and pick-me-up.

Flavoring.—Syl Lavandulæ, Syl Sassafras; Syrupus Aurantii, Elixir Simplex (not very good).

Tinctura Kolæ.

Dose.—20 to 60 minims (1·2 to 4 Cc.).

Kola nuts in powder 1, macerate one week in 60% alcohol *q.s.* to 6.

Vinum Kolæ.

Kola in coarse powder 1, in Sherry 25, macerate for 7 days, filter and flavour with Essence of Vanilla.

Celerina is said to contain Kola, Coca, Celery, and Viburnum.

Ⓟ **Syrupus Kolæ Compositus.**

Dose.—1 to 2 drachms (4 to 8 Cc.) twice daily.

Iron, Quinine and Strychnine Citrate 3, Citric Acid 0·3, Sodium Glycerophosphate 5, Liquid Extract of Kola 50, Alcohol 90% 25, Syrup of Orange to 100. Finished product to be slightly acid. In anorexia, and as a general 'tonic.'—Ph. Notes.

Maté, *Ilex paraguayensis* (*Ilicaceæ*) *Syn.* Yerba, Paraguay tea, or Jesuit tea, contains less caffeine than tea, and is less astringent. Removes fatigue and induces sleep.

For further notes on Maté—Analytical, Dietetic and Commercial, see Vol. II.

CALCIUM.

Ca=40·07.

Calcii Carbonas. $CaCO_3$=100·075. *Syn.* CRAIE PREPARÉE, GEFÄLLTES CALCIUM CARBONAT.

Dose.—15 to 60 grains (1 to 4 Gm.).

White insoluble powder. Much employed in diarrhœa and dysentery and as an ingredient in tooth Powders.

Sys Specific. An Indian cure for sprue, dysentery, and diarrhœa. It consists of 'powders' containing principally Calcium Carbonate —one to be mixed with 12 ounces of water and Ⓟ laudanum to be added, if necessary.

Mistura Cretæ, Chalk Mixture (*Off.*).

Dose.—½ to 1 ounce (15 to 30 Cc.).

Contains 3% with Sugar 6% and a little Tragacanth, in Cinnamon Water. The powders are generally kept mixed in a dry condition, and added to the cinnamon water as required.

Calcii Chloridum. (*Off.*). $CaCl_2$ = 110·99.

Dose.—5 to 15 grains (0·3 to 1 Gm.) in aqueous solution, or pills made with syrup; these must be kept in bottles.

In fused white agglutinated, very deliquescent masses.

Soluble (the fused salt) in water 1 in 1½, in alcohol 90% 1 in 3.

Incompatible with carbonates, phosphates, sulphates and tartrates.

Flavoring.—Prescribe as Elixir *q.v.* or with Elixir Adjuvans or Elixir Saccharini.

Uses.—Calcium chloride increases the coagulability of the blood, and so acts as a hæmostatic (Sir A. E. Wright). Coagulability of the blood is—

Increased by—
- Carbonic Acid,
- Calcium Chloride or Lactate,
- Milk,
- Magnesium Carbonate or Lactate.—L. i./08,96.
- Phosphoric Acid and Soluble Phosphates,
- Strontium Carbonate or Lactate,
- Thymus Glands.—L. i./06,645,739. See also B.M.J., ii/10, 1594.

Diminished by—
- Oxygen,
- Alcohol,
- Restriction of Food,
- Diminution of Lime Salts,
- Large quantities of Fluid,
- Citric Acid,
- Rhubarb,
- Acid Fruit Juices,
- Acid Wines,
- Tobacco Smoking,
- Bile,
- Leech Extract, Hirudin (*q.v.*).

It is employed in itching skin affections, *e.g.* pruritus, prurigo, urticaria. It is useful in chilblains, full dose frequently, and certain forms of headache, *v. infra.* In tubercular disease, chorea, glandular affections, to stop the growth of uterine fibroids, and to check the vomiting due to sarcinæ.

To check profuse menstruation it has been found well to give doses of 10 to 15 grains daily for a week before the period ; but not if there be kidney disease. Bleeding piles have been treated by injection every morning of 4 to 6 drachms of a 10% solution.

For inter-dental fissure 15% solution on pledget of wool.

Acute lobar pneumonia has been treated with 5 to 15 grain dose every 4 hours. Hæmophilia is well treated by this and the lactate.

To check intestinal hæmorrhages 30 grains daily may be given internally, and accompanied by rectal injections containing 60 grains to two pints of water ; opium may be given in addition.

For hæmoptysis give a rectal injection (high up) of 30 grains, with morphine hypodermically and ice to the affected part of the chest. Epistaxis has been well treated by 10 grains, *t.d.*

Heart failure accompanying post-influenzal pneumonia, Sir Lauder Brunton pointed out, may be averted by extended use of Calcium Chloride. Usual dosage is 5 to 10 grains every four hours. Increases secretion and tones up the vessels. May be prescribed as **Elixir** *q.v.*

For methods of Estimating Calcium Salts in blood, urine and other fluids, see Vol. II.

Calcium has a sedative effect on the nervous system and diminishes permeability of the walls of the blood vessels.—B.M.J. ii./10,1594.

Poisoning by Oxalic Acid is believed to be due to the removal of Calcium. Toxic symptoms and cardiac depression of Oxalic Acid poisoning can be relieved by giving soluble Lime Salts.—B.M.J. ii./10,1594.

Coagulation of the blood is thought to be little affected by Calcium Chloride *per os*, but injected under the skin the time of coagulation was reduced in 15 minutes from 3½ minutes before injection to 1¾ minutes after.—Dixon, B.M.J. ii./09,540 ; see also P.J. i./11,179.

ADMINISTRATION AND REMOVAL OF LIME SALTS.

Sir James Barr says that fixed *lime* (in the albumin molecule) increases viscosity and coagulability, while the *free* Calcium ions in association with the suprarenal and pituitary secretions increase the tone and contraction of the arteries and arterioles, heighten blood pressure and maintain force and efficiency of the cardiac contractions. Some persons absorb lime more quickly than others—a glass of milk may increase lime in the urine in an hour or two. The blood is the agent for carrying the lime to the tissues and from them to the excretory organs. Lime Salts have been found useful in treating exophthalmic goitre. The following are some special lines of treatment.

Angina Pectoris.—Phosphoric Acid ½ drachm (of the dilute acid) every four hours and all lime to be excluded from diet and the drinking water. On the other hand there may be deficiency of lime in which case Calcium Iodide and Iodine Tincture is beneficial.

Arteriosclerosis.—Chronic high tension leads to degenerative changes with subsequent atheroma and calcification of the deep layers of the intima of the aorta—lime salts are deposited as Calcium Soaps. Women are not so liable to arteriosclerosis as men—they get rid of a good deal of Calcium with each menstrual period.

Asthma.—There is an excess of free Calcium ions in the blood. Decalcifying agents to be given and lime-free diet. Milk, etc., rigidly excluded.

Bronchitis and *Emphysema.*—There is not, as a rule, too much free lime, but in the later stages too much fixed lime—rigid costal cartilages and fixed chest wall Never let these become rigid—use decalcifying agents and lessen intake of lime.

Cirrhosis.—Lime index generally low, owing to the catarrh of the stomach and the intestines set up by the alcohol. First stop the alcohol.

Colitis.—In some cases of obstinate constipation there is too much lime in the blood and intestinal wall. In mucous colitis all forms of lime should be forbidden. Fats of the unsaturated type, *c.f.* note under Oleum Morrhuæ, *e.g.*, a wineglassful of Olive Oil at bed time should be ordered.

Digestive Tract.—So-called "congenital" hypertrophic stenosis may be due to excess of lime in the milk. If people kept their bowels open, thus preventing *B. Coli* from assuming a malignant type, appendicitis would be rare. Some people absorb Calcium badly—this is due to the form in which it reaches the mucous membrane. The insoluble fats, Stearin and Palmitin, which constitute the greater part of beef and mutton fat, can be extracted from the fæces to the extent of 80% or more. The acids of these fats when split off readily combine with Calcium forming insoluble soaps which irritate the mucous membrane. Cod Liver and Olive Oil, butter and bacon fat contain a large amount of unsaturated fatty acids which, *even* with lime, form relatively soluble soaps. When, therefore, a person is for any reason on a + lime diet the fat should consist largely of Olein. This accounts for beneficial action of Cod Liver Oil in rickets (*c.f.*, B.M.J. i./11,500).

The popular view that milk is a suitable diet in adults in any form of illness is erroneous. In the production of intestinal stasis the lime salts play an important part. Insoluble Calcium Soaps have an injurious, irritating effect on the intestinal mucosa. On the other hand in atony of the stomach and intestines there is deficiency. Where lime is necessary it may be given internally as Iodide or Glycerophosphate or subcutaneously largely diluted with Normal Saline with addition of 5% Glucose.—B.M.J. ii./12,695; L. ii./12,537.

The commonest cause of gastric catarrh and of cirrhosis of the liver is alcohol; while the teetotaller from eating too much and from immoderate consumption of lime salts more frequently suffers from arteriosclerosis and chronic diseases of the kidneys.—B.M.J. ii./12,162.

Disseminated Sclerosis.—Calcium Salts useful: the Sodium Salts injurious. Acids should be avoided.

Epilepsy.—All the soluble Calcium Salts do good. Calcium Iodide is the most efficient. Milk foods good. *See also* Calcium Lactate.

Locomotor Ataxia.—The Calcium Salts are in excess. Give Acid and Strychnine.

Migraine.—Lime Salts as a rule are in excess. Eliminate same from the diet and give Magnesium Sulphate in the mornings.

Muscular System.—In myalgia, or the so-called muscular rheumatism, there is Calcium deficiency. Correct also any dilatation or acid fermentation.

Nervous System.—For stability and tenacity a certain amount of lime is necessary, but avoid too much for quick thinking, speaking and acting.

Neurasthenia and Hysteria.—Lime Salts variable. As a rule they are deficient—give Calcium Glycerophosphate.

Pneumonia.—" In the acute stage of pneumonia the more scanty and the more sticky the expectoration, the more viscous the blood, the more Lime Salts and leucocytes it contains, *caeteris paribus* the more favorable the prognosis, and on the other hand the more fluid and hæmorrhagic the expectoration, the more liquid the blood, the less the Lime Salts and leucocytes the worse the prognosis."

Rheumatism, Acute.—There is an excess of free Calcium ions and a tendency to fibrin formation. Milk diet does harm—plenty of red meat which increases the Ammonia in the tissues and thus neutralises the sarcolactic acid, is beneficial. In gout there is more frequently an excess of lime in the tissues and urine than in the free state in the blood—decalcify, *e.g.*, with Phosphoric Acid.

Skin—Eczema, etc.—In many cases there may be deficiency of lime and a dilated stomach. In urticaria, eczema and serum rashes there is deficiency of lime in the blood.

Tetany and Cramp.—Usually there is dilatation, acid fermentation and deficiency of Calcium Salts.

Urinary Tract.—Healthy kidneys always excrete a certain proportion of Calcium, though not so much as the bowel. When diseased. Calcium may be retained. It is useful to precipitate the lime when examining urine as a routine. If there be no excess in the blood there will be none in the urine, but the condition of the kidneys and the Sp. Gr. of the urine must be taken into account.

Wounds.—Heal best when there is a fair amount of Calcium in the blood—or it may be the other way. In all scar tissue there is a large amount of Calcium. In Dupuytren's contraction surgeons' operations have all failed. There is an excess of Calcium in these cases. —Sir James Barr.—B.M.J. ii./10,829.

In severe hæmatemesis of gastric ulcer the only reliable drug is Calcium Chloride, 1 drachm dissolved in 5 or 6 ounces of water given by the rectum, alone or in conjunction with saline transfusion or subcutaneous injections.—Whitla. Pract. Med.

In obstructive jaundice, to prevent hæmorrhage 30 grains thrice daily *per os*, and 30 to 50 grains simultaneously *per rectum.*—L. ii./09, 338.

In heart disease the benefit from milk diet may be due to content of lime salts.—(Brunton).

In tetany, laryngismus stridulus and infantile convulsions, stated to have marked calming influence in small doses.—M.A., 1908,12—but efficacy doubted.

Spasmophilia (tetany of infants) is said to be aggravated by addition of Calcium to the milk. Cows' milk contains five times as much Calcium Chloride as human. Tetany is viewed as a form of Calcium poisoning.—Pr., Oct./07,556.

In the **Nauheim baths** the increased specific gravity has a primary effect of raising the peripheral resistance of the body which is afterwards followed by reaction, and the effervescence stimulates, but the Calcium Chloride in the water has no effect—it is not absorbed—otherwise it might work great mischief.

Thrombosis or embolism, tendency to, should be stopped by decalcifying agents such as Phosphoric and Citric Acids and their soluble salts.—Sir James Barr, B.M.J. i./09,994, ii./09,509.

Consumption and bronchitis are notably absent amongst workers in lime kilns and those who drink hard water.—B.M.J. ii./08,1493.

Aneurism of the aorta (abdominal) apparently cured by Calcium Chloride in doses of 15—30 grains.—Whitla. Pract. Med.

The popular belief that hot lemonade 'cuts the phlegm' in bronchitis may be due to the fact that citric acid in lowering the coagulability of the blood would thus give it greater ease of gaining access to the infected focus.—B.M.J. ii./10,1917.

Decalcified dietary in arterial atheroma.—The amount of 'lime' necessary to man decreases with age. An adult should not take more than 1 Gm. a day—he eliminates about 0·9 Gm. *pro die*—elimination ought to be proportional to intake. Cows' milk, cheese, eggs, onions, contain 0·2%, being rich in lime. Moderately rich (0·1 to 0·2%) are peas, beans, cauliflower; poor in lime (less than 0·1%) are bread, meat, fish (most kinds), potatoes, apples, pears, plums, etc. Large amounts of milk, bread, beef tea, and green vegetables must not be taken by atheromatous subjects.

In dropsy Sodium Chloride to be excluded, while Calcium Salts are beneficial.—Sir James Barr, B.M.J. ii./10,829.

Rhinorrhœa completely removed by 30 to 45 grains a day for two weeks. Recurs sometimes at long intervals but yields again. No case absolutely unresponsive. Might possibly be useful also in spasmodic sneezing, hay fever and asthma.—B.M.J. ii./10,79.

Angio-neurotic œdema treated with 10 grain doses thrice daily, increasing to 20 grains. The swellings which appeared continuously in different parts of the body disappeared completely.—L.ii./09,295.

An excess of Calcium Salts in the blood thought to be associated with the menstrual period.—P.R.S.M., Obst. Sect., *Vol. I.*, 291.

Clinically the effect in skin disorders though good is not, as Wright holds, due to increased coagulability of the blood. The soluble salts have no particular value. Mistura Cretæ as useful as Calcium Lactate.—Prof. R B. Wild, B.M.J. ii./12, 696; L. ii./12,538.

W. Blair Bell believes in large doses of the Lactate—1 drachm. Given in large doses it acts as an aperient.—B.M.J. ii./12,698.

F. Ransom found that in glycosuria the greater the amount of sugar the larger the excretion of Calcium. It can be reduced by giving Sodium Bicarbonate.—B.M.J. ii./12,699.

Eclampsia treated by washing out the stomach and transfusion of a pint of Calcium Chloride Solution (30 grains to the pint) into a vein of the arm—also 20 grain doses four times daily *per os*. Rapid improvement. Possibly the Calcium Chloride may act as a sedative to the nerve cells.—B.M J. ii./12, 1124.

In nasal operations if excessive hæmorrhage occurs give Calcium Chloride or Lactate at once.—B.M.J. ii./13,737.

Vinegar and Orange Juice as possible causes of hæmorrhage in women. Several cases showed the association, supported by experiments with mixtures of Vinegar, Blood and Saline and controls without Vinegar.—with result that there was no coagulation in the bulk of the acidified in two months, and ample in the non-acidified in an hour. Calcium Salts required as treatment.—B. Myers, L. ii./13,1665.

Hay fever, especially where tendency to become chronic, treated by 10 grain doses thrice daily.—P.J. i./14,283. B.M.J.E. ii./15,4.

Liquor Calcii Chloridi B.P. 1885, was 1 to 5 of distilled water. *Dose.*—15 to 45 minims (1 to 3 Cc).

Elixir Calcii Chloridi. *Dose.*—1 to 2 drachms, best given 1 hour after a meal.

Calcium Chloride 60 grains, Orange Syrup and Syrup of Tolu of each ½ ounce.

Gelatinum Calcii Chloridi. (*c.f.* Gelatinum for further Gelatin Injections. *Dose.*—5 to 7 Cc. Warmed in a water bath and cooled to a suitable temperature. To arrest hæmorrhage injected into the gluteal region.

This contains Calcium Chloride 5%, with Gelatin 5 to 10%. The addition of Gelatin stated to avoid the necrotic effect of the Salt.—Pr. May, '13,902.

In the siege of Kut-el-Mara Calcium Chloride was urgently needed by the Mesopotamia forces for treatment of scurvy. It was "home-made" by acting on lime with Hydrochloric Acid, of which latter there was abundance(used with Potassium Chlorate for chlorinating water). Nearly 2 lbs. of this home-made Calcium Chloride was issued daily for 2½ months.—Col. Hehir, from Report of Parliamentary Commission appointed to enquire into the Mesopotamia Campaign.—C.D. i./17,576.

Calcii Iodidum. $CaI_2=293{\cdot}91$. *Syn.* **Calcidin.**

Dose.—2 to 4 grains (0·12 to 0·25 Gm.). Given in *dilute* aqueous solution. Deliquescent crystalline powder. On exposure to light or air will give off Iodine; best preserved in amber bottles. Excellent results in foul ulcers and chilblains.—B.M.J. ii./06,138,1718; i./07,991.

Eczematous patch on tibia measuring 7 × 3 inches cured by 4 grain doses thrice daily. Diabetic ulcer on foot, also seat of recurrent mammary carcinoma were treated with.—B.M.J. ii./07,909.

In diabetes has been found to have good effect in reducing the amount of sugar excreted.—Pres. Jan. 1911, p. 2.

Varicose Ulcers.—Calcium Iodide in 10 grain doses *t.d.*, between meals and an Ointment containing Allantoin or Comfrey will probably heal these in a month. A few skin grafts prior to the Ointment to expedite.—B.M.J. ii./12,1740.

G. Arbour Stephens writes that contrary to Prof. Dixon's opinion that no useful drug had been introduced except by a man with a laboratory, he, without a laboratory, introduced the useful drugs—the Iodide and Permanganate of Calcium.—B.M.J. ii./12,1582 · P.J. ii./12,555

Elixir Calcii Iodidi.—*Dose.*—1 drachm (**4 Cc.**) Calcium Iodide 3 grains, Aromatic Elixir 1 drachm. Has been employed in tuberculosis.

For further notes on Lime Salts see Calcium Lactate.

Calcii Peroxidum. *Syn.* CALCII SUPEROXYDUM. GORIT. CaO_2 = 72·07. It may be made + $8H_2O$.

Dose.—3 to 10 grains (**0·2 to 6 Gm.**) daily.

A white crystalline powder slightly soluble in water, evolving oxygen. It explodes if mixed with Glycerin or Formalin.

A useful intestinal antiseptic, given in milk, for infants, *e.g.*, in summer diarrhœa. Recommended in hyperacidity.

Under the name "**Calox**" is contained in a dentifrice.

Magnesium Peroxide 5 to 10% added to a prepared or precipitated chalk powder is even better as a dentifrice.—P.J. i./07,284.

Experiments on rabbits showed that Gorit has powers antagonistic to Hydrogen Cyanide. Germicidal power less than that of Hydrogen Peroxide.—U.S.D.

Soil-contaminated Wounds : Suggested use on. See **Wounds.**

Calcii Phosphas. (*Off.*). $Ca_3(PO_4)_2$ = 310·29. 'NEUTRAL' or 'TRIBASIC' CALCIUM PHOSPHATE, CALCIUM ORTHO-PHOSPHATE.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

White powder made by interaction of calcium chloride with sodium phosphate and excess of ammonia at a boiling temperature. Insoluble in water ; soluble in dilute hydrochloric and nitric acids.

Uses.—To supply lime to growing bones and to assist in general nutrition. Is also given to pregnant women for the same purpose. Is an ingredient in Syrupus Ferri Phosphatis Compositus, *q.v.*

Magnesium infiltration as result of lime depletion in chorea to be overcome by excess of this element, *e.g.*, Calcium Phosphate 5 grains well mixed with Milk Sugar 5 gr., *t.d.*, should be tried.—J. Aulde, L. i./13,640.

Tuberculosis.—For the remineralisation of the body Robin advises powdered bones combined with other substances, *e.g.*, Powdered Fresh Bones 15 grains, Precipitated Calcium Carbonate 6 grains, Magnesium Carbonate 1½ grains, Sugar 15 grains, Calcium Fluoride ⅛ grain, Calcium Silicate ½ grain, to be taken at the end of the two principal meals of the day mixed with a little Vichy Water.—"Journ. de Méd. et de Chir prat." per C.D. i./13, Index Fo. 52.

Calcii Phosphas Mono-acidus. FR. CX. *Syn.* DIBASIC CALCIUM PHOSPHATE, CALCIUM MONO-HYDROGEN PHOSPHATE.

$Ca_2H_2(PO_4)_2, 4H_2O$ or $CaHPO_4, 2H_2O$=172·15.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**). Prepared by decomposing Calcium Chloride with Dibasic Sodium Phosphate.

Colourless crystals with slight acid reaction. Used in making Liquor Calcis Lactophosphatis, *q.v.*

Commercially the acid salt is a much purer compound, and it might be better to omit the calcium ortho-phosphate altogether, and employ only the dicalcium phosphate in medicine.—C.D. ii./08,797.

Calcii Phosphas Di-acidus. FR. CX *Syn.* MONOBASIC CALCIUM PHOSPHATE, OR ACID CALCIUM PHOSPHATE.

$CaH_4(PO_4)_2, 2H_2O$=270·21.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Deliquescent crystals, insoluble in alcohol.

Mix Calcium Mono-acid Phosphate 154 Gm. with Phosphoric Acid (50%) 200 Gm. to a paste, and leave to stand 1 hour at about 50° C.;

add water sufficient to make clear and boil ¼ hour. Evaporate to Sp. Gr. 1·04 (taken on the warm liquor) and leave to crystallise.—Fr. Cx. We have employed this Salt for time past in making **Syrupus Tann-Iodo-phosphoratus** and **Vinum Tann-Iodo-phosphoratum**, *q.v.*

Calcii Saccharas.

Dose.—8 to 30 grains (**0·5 to 2 Gm.**).

In colourless tufts, soluble in water. An antacid for dyspepsia, specially for children; also as an antidote to carbolic acid poisoning in 10 times above doses.

Calcium Monosaccharate is $C_{12}H_{22}O_{11}CaO$ = 398·306.

The **Di-Calcium Saccharate** has the composition $C_{12}H_{22}O_{11}2CaO$ = 454·376, and the **Tri-Calcium Saccharate** is $C_{12}H_{22}O_{11}3CaO, 3H_2O$ = 564·494. The compound of our own manufacture is the mono-saccharate.

Liquor Calcis Saccharatus. (*Off.*).

Dose.—15 to 60 minims (**1 to 4 Cc.**).

Prepared by interaction of slaked lime and sugar. Contains nearly 2% Calcium Oxide.

Calcii Hydras. $Ca(OH)_2$ = 74·086. Should be recently made by action of water on calcium oxide. Has slight caustic action. Is more soluble in cold water than in hot. **Liquor Calcis** is given to infants with milk.

Warts (verruca plana) on back of the hand cured in a week by ½ pint a day.—B.M.J. i./10,81.

Linimentum Calcis (*Off.*).

Solution of Lime 1, Olive Oil 1; or with Linseed Oil 1, is known as

Carron Oil—St. Bart.'s H.; Mid. H.

Eucalyptus Oil 1 to 2% is often added as antiseptic.

In the tropics Arachis and Sesame Oil are permitted.

Calcii Sulphas. $CaSO_4,2H_2O$=172·162.

Dose.—20 to 30 grains daily (**1·2 to 0·2 Gm.**)

A heavy white powder soluble in water 1 in 390.

For phosphaturia is considered a specific; it may be well given with an equal weight of Heavy Magnesium Carbonate.

Dried Calcium Sulphate, $2CaSO_4,H_2O$ = 290·276, so long as it remains dry, is used to make Plaster of Paris splints. Two pounds require about one pint of water; this sets rapidly and firmly. U.S. have a powder about 95% $CaSO_4$ and 5% water.

Moistening with 5% Dextrin Solution makes a strong dressing but sets slowly. Sodium Chloride 1% added hastens setting but 2% retards.—B.M.J. ii./06.800

Plaster of Paris Bandages, 2, 2½ and 3 inches wide (6 yards) In sealed tins.

Crinoline Bandages are used for above and for silicating (*c.f.* Sodii Silicas).

Calx Sulphurata (*Off.*) U.S. *Syn.* CALCII SULPHIDUM CRUDUM; CANTON'S PHOSPHORUS. Contains not much less than 50% CaS=72·13 (at least 55% U.S.).

Dose.—$\frac{1}{4}$ to 1 grain (0·016 to 0·06 Gm.) in pill.

Some forms of it shine in the dark and are used in luminous paint.

Luminous Paints. Recent Account. See P.J. ii./15,806; (CaS.) i./16,105.—See also Radium Luminous Paints.

Is prepared by reducing Calcium Sulphate by charcoal. A greyish powder with sulphuretted odour sparingly soluble in water with decomposition. It thus represents the properties of Harrogate, Barèges, Gilsland, and similar springs. Largely used for boils, carbuncles, acne, scrofulous sores, especially in glands of the neck. It rarely purges even in 2 grain doses thrice daily. Some give small doses *every hour.*

In bronchitis and phthisis where sputum is tenacious and ropy, cough hard and prolonged—Calcium Sulphide liquefies sputum and makes cough easier. In abscess of the middle ear, urinary tract, acne and wherever there is pus formation Calcium Sulphide should be given. In follicular tonsillitis $\frac{1}{2}$ grain may be given every hour until alleviation, then every two hours, said to act as specific. In zymotic diseases, Calcium Sulphide probably finds its most useful place. In the treatment of contagious diseases of childhood Calcium Sulphide seems to act similarly to Antitoxin,—that is, it increases the inherent power of the blood to destroy bacteria and their poisons. Should be given throughout the course of measles, scarlet fever, diphtheria and whooping-cough.—Clin. Med. Jan. 1911.

Pilula Calcis Sulphuratæ, $\frac{1}{12}$, $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, and 1 grain.

Tablets contain $\frac{1}{4}$, $\frac{1}{2}$, and 1 grain. Keep in bottles.

In strumous ophthalmia, as well as in periostitis and alveolar abscesses has been found of service. For boils give 1 grain *t.d.*, increased to 8 grains *p.d.*

Stearettes of Calcium Sulphide, freshly made, should prove useful in suppurative conditions in fairly large doses, *e.g.*, 1 grain in each. They would avoid decomposition in the stomach.

Lotio Calcii Sulphurati, U.C.H. 1904.

Slaked Lime 4, Sublimed Sulphur 4, Distilled Water 35. Boil together, evaporate, and filter, to produce 20 of solution. Diluted with an equal quantity of warm water is a remedy for itch, which it will cure in half an hour. It resembles in composition **Vleminckx' Solution.** (**Calcium Sulfuratum Solutum.**—P. Helv.).

For eczematous itching baths of the Solution 1 tablespoonful to every 7 gallons of water have been used.

In scabies found too irritating for use. Not equal to a weak Sulphur Ointment in curative effect.—B.M.J. ii./17,468.

Sulphurated Lime Depilatory.

Milk of lime charged with sulphuretted hydrogen.

Syrupus Sulphatum (H. P. Symonds).

Dose.—$\frac{1}{2}$ an ounce (15 Cc.) contains appropriate doses of the sulphates of Beberine, Quinine, Iron, Potassium and Sodium. Is useful for boils, &c. Taken twice or thrice daily.

Pilula Sulphatum.

The salts of half-an-ounce of this syrup in two pills.

CAMPHORA.

$C_{10}H_{16}O=152{\cdot}178.$

Dose.—2 to 5 grains (**0·12 to 0·3 Gm**).

Camphor is a white crystalline substance obtained from *Cinnamomum camphora* (*Lauraceæ*) in Formosa and Japan. It is sold in bells, and in ¼, ⅓, ½, 1 and 4 ounce cubes, also as **Flowers of Camphor.** The latter is a convenient form for dissolving.*

For Artificial Camphor, see Vol. II.

Melting Point 175° C., Boiling Point 204° C.—P. Jap.

Soluble in water, 1 in 700, in alcohol 90% 1 in 1¼ (more soluble in absolute alcohol), in ether 12 in 7 barely, chloroform 4 in 1 scarcely, volatile and fixed oils (olive 1 in 3), in glacial acetic acid 2 in 1.

It is rendered more soluble in water by the presence of carbonic acid, acid carbonate and carbonate of magnesium, sugar, and myrrh, and less soluble by bromide of potassium, liquor potassæ, sulphate of magnesium, alkaline carbonates and many other salts.

Camphor, when mixed in certain proportions with many crystalline substances, causes mutual liquefaction of the two—*e.g.*, camphor 4, phenol 12, and water 1 (*see* Acidum Carbolicum); camphor 1, and chloral hydrate 1 (*see* Chloral Hydras); camphor 2 and menthol 3 (*see* Menthol); camphor 1 and thymol 1 (*see* Thymol); camphor 2 and β-naphthol 1 (*see* Naphthol); camphor 2 and salol 3 (*see* Salol); camphor and butyl-chloral hydrate liquefy when heated, but solidify on cooling; so will camphor 84 and salicylic acid 65 (*see* Camphora Salicylata). Camphor is powdered by rubbing with a few drops of alcohol.

Flavoring.—Extractum Glycyrrhizæ Liquidum.

Uses.—Sedative, anti-spasmodic, carminative, expectorant, diaphoretic, anaphrodisiac, antiseptic, given internally to abort colds in the head, to relieve hiccough, for whooping cough, diarrhœa, chordee and lumbago. Is injected as a stimulant for patients *in extremis*.

For arteriosclerosis and for old patients with heart trouble continued use of camphor internally is of value.—L. i./18,143.

Meningitis caused by camphor liniment has been treated by caffeine injection.

Camphor habit.—B.M.J. ii./98,84.

Caution.—It is dangerous to place camphor or menthol, *e.g.*, a 20% ointment into the nostrils of an infant. A small quantity of this camphor ointment applied in this way for coma in an infant of 9 months caused immediate collapse with signs of a severe syncopal attack.—Pres., July, 1913.

Besides the official preparations, **Camphor Water,** (Camphor Julep or Mixture) 1 in 1,000, Liniment† 1 to 4 Olive Oil (U.S. orders same strength in camphor to be prepared with Cotton Seed Oil‡—Oleum Gossypii Seminis expressed from *Gossypium herbaceum* and other species—*Malvaceæ*), **Ammoniated Liniment** (—*Poisonous, not to be taken*) 12½%, with Lavender Oil 0·5%, and Strong Solution of

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*Essential Oil of Camphor is of a pale straw-colour or darker, with fragrant odour, Sp. Gr. 0·898 to 0·920; consists principally of a terpene, with about 1 in 4 or less of camphor in solution, the heavy variety is preferred for rubbing in rheumatism. The heavy Oils range from 0·975 to 1·025, 50 to 75% Safrole. Light fractions practically devoid of same.—P.J. ii./08.62.

† In preparing this, '*English-refined*' flowers should be rubbed through a sieve, and dropped into the oil at 70° to 80° F. Foreign flowers give muddy solution. **Oleum Camphoræ Forte, P.G.V.** is the same strength.

Examination of camphorated oil for camphor substitutes.—P.J. i./09,3.

Ammonia 25%, Alcohol 90% *q.s.*, **Spirit** 10% (and U.S.), and **Compound Tincture** 0·3%, the following are in use:—

Aqua Sedativa. **Eau Sedative.** LOTION AMMONIACALE CAMPHRÉE (FR. CX.).

Spirit of Camphor 10, Sodium Chloride 60, Solution of Ammonia 60, Distilled Water 1,000, all by weight. As a compress for migraine and rheumatism, and to contusions.

Camphor Ball.

Spermaceti 4, White Wax 12, Oil of Almonds 5; melt in a water bath and add Flowers of Camphor 4. Dissolve, and when nearly cold pour into moulds. Useful for chapped skin

Camphorated Chalk.

Flowers of Camphor 1, Precipitated Calcium Carbonate 7 Mix, and sift for use as a dentrfrice.

Camphorated Carbolic Acid, *vide* **Acidum Carbolicum.**

Elixir Camphoræ. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Spirit of Camphor 10, Syrup 5, Distilled Water 1. Contains 1 in 16. It mixes and diffuses well in water.

Æther Camphoratus, P. Helv. Camphor 1, Æther 9. Dissolve. **P. Dan.** has 15% in Spiritus Ætheris.

Oleum Camphoratum, Huile Camphrée Fr. Cx. 1 to 9 of Olive Oil.

Injectio Camphoræ Hypodermica. *Dose.*—10 to 30 minim (**0·6 to 2 Cc.**).

Camphor 1, Sterile Olive Oil to 5.

In pneumonia 25 minims has been given as a general rule to start with, but much larger doses have been employed—even 12 Cc. of a 20% solution.

Injectio Camphoræ Hypodermica (Aetherea) L.H.

Camphor 2 grains, Ether 3 minims, Olive Oil to 10 minims.

Sterules, Hypodermic contain Camphor 1½ and 3 grains in Sterile Olive Oil; **Sterules of Camphor** ½ grain, **with Ether 15** minims; also **Sterules** of Camphor 3 grains with Guaiacol 2 grains, employed in phthisis.

Curschmann's Solution.

Dose—15 minims (**1 Cc.**) increased if necessary.

Camphor 2, Ether 3, Olive Oil 7.

Sterules of Curschmann's Solution 1 Cc. = **0·2 Gm.** (3 grains) of Camphor are prepared.

Cardio-vascular diseases treated by Camphor. During the course of chronic myocarditis with simple cardiac insufficiency, changes in rhythm and auricular fibrillation, no drug can compete with Camphor in sustaining activity of the heart and steadying the pulse. *Dose,* 0·1 Gm. (1½ grains) in oil hypodermically once or twice daily—or *per os.* Not merely a remedy in the hour of death, but used intelligently can be given with benefit throughout the entire course of various cardiac and vascular diseases.—Prof. Marfori —Policlinic, per L. ii./17,466.

For use in heart failure in typhoid and pneumonia it is one of the most valuable excitants we possess.—U.S.D.

Gassing by Chlorine, etc. It has been injected for the cardiac weakness.

Injections of Camphor and Ether are practised for patients *in extremis* Gastric hæmorrhage is stated to have been arrested by the injection. Not suited when there is insufficient active carbohydrate metabolism.

In purulent peritonitis 100 Cc. of 1% Sterilised Solution of Camphor in Olive Oil, poured into the peritoneal cavity after opening and removing the appendix and wiping away pus, and distributed over the whole area of the peritoneum. Also advised as prophylactic in all sections where the peritoneum is already affected.—B.M.J. ii./11,764.

Sciatica and Neuritis well treated.—Jensen, B.M.J,E. i./20,17.

Caution.—Various amounts (30 to 300 Cc.) of 1 to 10% Sterile Camphorated Oil have been injected in this way. A case recorded of acute poisoning from 170 Cc. of 10% Solution after an operation of the uterus. 1% may be safe and not more than 300 Cc. of this solution.—L. ii./12,546.

Ⓟ **Pigmentum Camphoræ Chloral et Menthol.**

Acute fibrositis. In early stage hot fomentation useful. Afterwards one of the best applications is Camphor, Chloral Hydrate, and Menthol, *p. aeq.*, painted on and rubbed in gently with the fingers—or paint with Iodine Tincture, and apply hot poultices or very hot fomentation.—A. P Luff, B.M.J. i./13,858.

Pilula Camphoræ.

The most suitable excipient to form camphor into pills is about ⅓ its weight of powdered curd soap and a few drops of alcohol, or a little lard in a warm mortar.

Tablets, Camphor and Quinine. Camphor ¼ grain, with Quinine Acid Sulphate 1 grain. To check catarrh, and as a tonic.

Spiritus Camphoræ Fortior. *Syn.* RUBINI'S SOLUTION.

Flowers of Camphor 1, Absolute Alcohol (by weight) 1. *Dose* for diarrhœa.—2 to 5 drops on sugar every 5, 10, or 15 minutes, according to the severity of the symptoms.

Trochisci Camphoræ contain 2 grains in each.

Wool, Absorbent, Camphorated (33%).

Acidum Camphoricum, U.S., VIII. PH. NED., P. HELV., P. JAP.

$C_8H_{14}(COOH)_2$=200·178.

Dose.—10 to 20 grains (0·6 to 1·2 Gm.) in cachets.

Formed on oxidation of camphor with nitric acid (test for free nitric acid with ferrous sulphate) odourless crystals, M. pt. 187° C.

Soluble in water about 1 in 200, in alcohol 90% about 1 in 1½, and in fatty oils about 1 in 10. It is dextrorotatory.

Synthesis of Camphoric Acid.—Na. Feb. 1911, 522.

Uses.—With success in night sweats of phthisis, also in cystitis by intravesical injections of 2% aqueous solution with 11% alcohol (M. 01,28), and as an intestinal disinfectant. Further in solution as a local astringent for nose and throat, also for diarrhœa. In skin affections saturated solution in dilute alcohol locally useful.

Camphora Monobromata, $C_{10}H_{15}BrO$=231·09.

P. Helv. directs—gradually combine Camphor 15, Bromine 16 in a mortar. Also official in U.S and P. Jap.

Dose.—2 to 10 grains (0·12 to 0·6 Gm.) in pills, with ⅓ of its weight of curd soap and proof spirit *q.s.*

In colourless prisms, soluble in ether, alcohol, and fixed oils, insoluble in water. Should be soluble in sulphuric acid—nearly colourless solution. M. pt. 76° C.—P. Jap. It is used as a hypnotic, and of value in epileptic vertigo, cases of petit mal, chorea, hysteria, delirium tremens, whooping-cough and asthma, and for erections in gonorrhœa.

Tablets contain 1 grain (0·06 Gm.). **Perles** 2 grains (0·12 Gm.)

Elixir Camphoræ Monobromatæ.

Monobromated Camphor 1, Spirit of Cinnamon (1 in 10) 10; dissolve and add Red Elixir 60, Syrup *q.s.* to 100. *Dose.*—½ an ounce (15 Cc.).

Enuresis well treated with this combined with belladonna, where potassium bromide is unsuitable.

Camphora Salicylata. *Dose.*—1 to 5 grains (0·06 to 0·3 Gm.), in pill, with suet or lard.

Camphor 56, Salicylic Acid 44, combined. Soluble about 1 in 20 in oils and alcohol. As ointment in skin affection.

Trochisci Camphoræ Salicylatæ Compositi. Camphor Salicylate 2 grains, Sodium Sulphate 4 grains. One thrice daily an hour before food. To ward off a cold.

✱ **Camphosal** (T.M. 305422) a combination of camphoric acid and santalol. A yellowish-brown oil used in urethral troubles. **Capsules** containing 0·25 Gm. are prepared. *Dose*—3 to 4.—F.N 1911.

CANNABIS INDICA (*Off.*), U.S.

The dried flowering or fruiting tops of the female plant of *Cannabis sativa* (*Urticaceæ*), grown in India (not deprived of resin). The masses obtained in European commerce are called Guaza. Ganja differs slightly and is more active. Bhang or Hashish consist of the leaves, small stalks and fruits.

The therapeutic value of the drug is contained in the resin. It appears to contain no peculiar alkaloid. The constituent Cannabinol becomes oxidised on exposure to the air. For use in medicine it should be as fresh as possible.—P.J. i./02,363. It is a powerful drug.

A high export duty is imposed on it. *N.B.—The official dose of Extract has proved toxic.*

For details of Assay and Physiological Examination, see Vol. II.

Cannabinol.—The red oil obtained by Marshall in 1896 from Charas (*See Vol, II.*), is physiologically active but it is a crude substance containing various bodies. Again, it is not the only active substance. Description of effect of red oil on the author of the paper.—delightful dreams.—H. A. D. Jowett, P.J. i./13,403.

Antidotes.—Stomach pump, emetics, stimulant draughts, artificial respiration, coffee. No death from cannabis is on record.—H.

Flavoring.—*Vide* Tinctura.

Uses.—For chordee and asthma, also as an aphrodisiac, and is successful in migraine. Is a narcotic and anodyne, but may give peculiar dreams and even delirium.

It is useful in dysmenorrhœa, especially with Gelsemium; with Nux Vomica in incipient delirium tremens, nausea, and paroxysmal colic, supraorbital neuralgia, cough of phthisis and for whooping-cough. It is of great use combined with strychnine, with chloral in chorea in mental worry and restlessness. Should be given in small and frequent doses. It is *the* remedy for menorrhagia.

In delivery, may in some cases hasten the contraction of the uterus, acting quickly without anæsthetic effect.—U.S.D.

In obscure forms of pruritus the Tincture is of value—suspended in mucilage and given after meals well diluted.—B.M.J. ii./09,452.

In gonorrhœa (urethritis acuta anterior) Cannabis internally with Hyoscyamus useful before patient is in condition for injections.—Pr. Apl. '09, 544.

Extractum Cannabis Indicæ (*Off.*). In U.S. is *assayed biologically.*

Dose.—$\frac{1}{4}$ to 1 grain (0·016 to 0·06 Gm,), in pill with lycopodium. An alcoholic extract, of which 1 dissolved in alcohol 90% *q.s.* to 20 forms—

Tinctura Cannabis Indicæ (*Off.*). U.S., 1 in 10 of alcohol, assayed biologically. *Dose.*—5 to 15 minims (0·3 to 1 Cc.), in some mucilaginous fluid.

Flavoring.—Glyl Lavandulæ, Glyl Amygdalæ Amaræ, Glyl Pini, Syl Vanillæ; Syrupus Aurantii, Syrupus Zingiberis.

Tablets equal 5 minims.

Tetanus after child birth, two cases cured by 15 minims of Tincture every 3 or 4 hours.—L. i./06, 1608

Fluidextractum Cannabis, U.S. 1 = 1. An alcoholic percolate assayed biologically. *Dose* —$1\frac{1}{2}$ minims (0·1 Cc.).

Pilula Extracti Cannabis Indicæ, contain $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 grain.

In sciatica a pill of Cannabis Extract and Hyoscyamus Leaf in powder of each 1 grain is useful. *Dose.*—2 to 5 during the day. Local treatment, often of the first importance, should be combined with this.—Pr., Mar. 1911, 459.

P1 CANTHARIS.

P1 *Cantharides and its poisonous derivatives.*

Ⓟ *Cantharides, Tincture and all vesicating liquid preparations and admixtures of* (*and N.B. last clause of Part II. of Schedule*).

Syn. LYTTA ; SPANISH OR BLISTERING FLY.—P. Jap. has Epicauta Gorhami with 1% Cantharidin.

Dose.—$\frac{1}{16}$ to $\frac{1}{2}$ grain (0·004 to 0·03 Gm.) in pill. Better given as tincture. FR. CX. Max. single dose $\frac{3}{4}$ grain. Max. in 24 hours, 2 grains.

Antidotes.—Emetics, stomach pump, white of egg (no fats); sedatives.

For note on Estimation of Galenicals, see Vol. II.

Uses.—Externally vesicant, irritant and powerful counter-irritant. Used in pleurisy, pericarditis, meningitis, neuritis, applied above the stomach to stop vomiting and in rheumatoid arthritis, (*v.* Emplastrum).

Internally is said to have aphrodisiac properties. Has been given in lupus and in chronic gout. Caution, avoid irritation of the kidneys. Hæmaturia is checked by five-minim doses of tincture. It is of service in incontinence.

In cardiac dropsy Cantharides is one of the most useful means of promoting diuresis. It acts on the secreting cells of the tubules, and the effects manifest themselves quickly. Dose of Tincture may be 2, 3 or 10 minims according to age, given several times daily. Can usefully be added to a mixture containing Caffeine, Tincture of Strophanthus and Spirit of Nitre.—B.M.J. i./11,292.

P1 **Mylabris phalerata** and *sp.* are not now official but were in I.C. Add. for making external applications in India. These contain about 1 to 2% of the neutral principle—

P1 **Cantharidinum** (*Off.*), P. Helv. (M. pt. 210° C.).
$C_8H_{12}O\,(CO)_2O = 196{\cdot}146$.
Or more than double the amount in Cantharides.

Cantharidin is the Lactone of Cantharidic Acid, in flat glistening rectangular prisms, which melt at 210° C. approx., and volatilise in very irritating white fumes. ***Soluble*** 1 in 56 of chloroform, 1 in 38 of acetone, and about 1 in 150 of acetic ether. Soluble also in ether, benzene, glacial acetic acid, 1 in 1,000 of absolute alcohol, and about 1 in 400 of water (Greenish).

Uses.—Solutions of Cantharidin, as well as other preparations of cantharides, are employed for stimulating the growth of the hair, in alopecia, and preventing its falling off.

Ⓟ **Acetum Cantharidini** (*Off.*) contains Cantharidin 1 in an Acetic Acid solution *q.s.* to 2,000. Replaces **Acetum Cantharidis** B.P. '98.

Ⓟ **Linimentum Crinale** (Squire).
Cantharidin 1 grain, Acetic Ether 6 drachms; dissolve with gentle heat, and add Alcohol 90% 6 ounces, Castor Oil 2 ounces, Lavender Oil 15 minims. It is better to dilute this with an equal quantity of spirit, and the head should be washed after applying it a few times, to prevent the cantharidin accumulating.

Ⓟ **Emplastrum Cantharidini** (*Off.*) contains Cantharidin 1, in a basis of Beeswax 225 and Wool Fat *q.s.* to 500 previously melted together. Replaces ⓅEmplastrum Cantharidis B.P. '98. The wax may be decreased or increased if necessary.

Ⓟ **Emplastrum Calefaciens** B.P.'98.—Is $\frac{1}{10}$ strength of this.

Ⓟ**Emplâtre Mouches de Milan** used in France is similar to Emplastrum Cantharidis B.P. '98.

In rheumatoid arthritis counter-irritation valuable,—it must be prolonged and pronounced. Slight irritation is useless and it must be in the neighbourhood of the cervical and lumbar enlargements. Cantharides plasters 4 in. or 5 in. by 2½ in. painted over immediately before application with Cantharides Liniment or Liquor Epispasticus to ensure rapid action, are applied at bed time one on each side of the seventh cervical vertebra or the twelfth dorsal, according as the joints of the upper or lower extremities are most affected—leave on for 24 hours. If the patient's kidneys are unhealthy the electric cautery should be used instead of Cantharides. After blistering and cutting away the loose cuticle a bread poultice made with Boric Lotion is applied over night. Next morning dress with fresh Savin ointment and repeat every eight or ten days—soak well with Boric Lotion in removing. Twenty drops of Laudanum at night useful. Pain and swelling of joints generally much relieved after three or four days. For further details of the method (general treatment of patient) refer to Latham P.R.S.M. Baln. Sectn., May, 1910, p. 110 or L. i./10,929.

The theory is that the changes in the joints and muscular wasting are due to active and destructive lesions in the spinal cord, and especially the cervical and lumbar enlargements. See also B.M.J i./13,864.

Ⓟ **Emplastrum Vesicans.**

Cantharidin 1, Chloroform *q.s.*; heat to dissolve and add to Yellow Wax, and Wool Fat, in equal portions, previously melted together, 499.

Ⓟ **Liquor Epispasticus** (*Off.*) is now made about same strength as B.P. '98, using Cantharidin.

Ⓟ **Collodium Vesicans** (*Off.*) is approximately the same strength.

Ⓟ **Linimentum Cantharidis Compositum,** W.H., has Liquor Epispasticus 60, Glacial Acetic Acid 20, Rosemary Oil 3, Castor Oil 90, Alcohol 90% to 480.

Ⓟ **Emplastrum Cantharidis Liquidum,** a special preparation, is painted on with a brush. It dries rapidly, forming a pellicle on the skin. Effect more certain than with a plaster.

The size of a blistering plaster is usually 1 inch square—rarely more than 2 inches square. For applying behind the ear the shape should resemble that of the space formed when the tip of the forefinger comfortably touches the tip of the thumb.—Marshall.

Effects of painting the side with the Liquor to the size of a surface measuring 7 by 2¾ inches—in error. Blood, albumin, kidney cells passed in the urine.—L. ii./08,800.

Ⓟ **Tinctura Cantharidini** (*Off.*) 1 in 10,000; is approx. 1/7 strength of F.I. U.S. 1 of Cantharides in 10 Alcohol (94·9% vol.). *Dose.*—2 to 5 minims (0·12 to 0·3 Cc.).

Fr. Cx. 1 of Cantharides in 10, Alcohol 70%. (F.I.) Max. single dose 9 minims and max. during 24 hours 25 minims approx.

Lupus treated by doses *per os* of 8 minims (½ Cc.) of a 1 per 5,000 solution of Cantharidin in Tincture of Orange well diluted with water and in conjunction with mercury have proved beneficial in syphilis.—B.M.J. ii./02,1231.

Ⓟ **Unguentum Cantharidini** (*Off.*).

Contains Cantharidin 1, dissolved by means of Chloroform in Benzoated Lard. Strength 1 in 3,000. Is about ⅔ strength of Unguentum Cantharidis, B.P.'98.

One part diluted further with two of soft paraffin forms a useful pomade for stimulating growth of the hair.

Erasmus Wilson's Ⓟ **Unguentum Stimulans** is described as consisting of 1 of Cantharides in 5 of plain lard.

Ⓟ **Unguentum Cantharidin cum Hydragyro Compositum** is sold as 'Pomade Max.'

Ⓟ **Unguentum Hydrargyri Oxidi Rubri et Cantharidis,** W. H. Blistering Liquid 15 minims, Red Mercuric Oxide Ointment 1 ounce.

P1 **Potassii Cantharidas.** Fr. Cx. (+ $1H_2O$).
$C_8H_{12}O(COOK)_2,2H_2O=326{\cdot}378$.

Dose.—1/400 to 1/200 grain (0·00015 to 0·0003 Gm.) hypodermically in very dilute solution. In minute white needles, soluble 1 in 25 of water. Has properties representative of Cantharidin, *q.v.*

A case of suppuration in the ear, perforation and discharge following influenza. At the time of treatment the suppuration had ceased and the ear was dry although a large perforation remained. Treated by a 'paint' of Liq. Epispasticus 1 in 10 in Compound Tincture of Lavender and then subsequently 1 in 8, 1 in 6, 1 in 4, and 1 in 2. The drum head was at first lightly touched daily with a cotton mop of the 1 in 10 dilution. After reaction to this irritant a stronger paint was used. The strongest is only required when granulation tissue has been formed on the membrane. Within a fortnight a whitish film formed on same which was removed. The drum head gradually thickened. At the end of the month perforation healed. The upper half only of the structure was treated as it has a more generous blood supply, and will, therefore, tolerate these measures with less risk of perforation than the lower half.—This proceeding affects the whole drum head. Result: sound ear and restored hearing.

A Solution of Potassium Cantharidate,—Cantharidin 1 grain, Potassium Hydroxide 1 grain, Water 300 minims, *i.e.*, equivalent to the Liq. Epispasticus,—applied similarly was successful in tightening loose drumheads This is diluted for use with Glycerin and Water equal parts.

Numerous cases of deafness from various causes treated and markedly improved.—C. J. Heath, 'The Nature and Causes of Catarrhal, "Throat" or Hereditary Deafness.' May, 1912.

CAOUTCHOUC. (B.P. '98.)

India-Rubber. *Syn.* ELASTICA.

The prepared milk-juice of *Hevea brasiliensis* (*Euphorbiaceæ*) and other species; known in commerce as Pure Para Rubber.

Preservation.—The best means of preserving rubber goods is to immerse completely in distilled water. Lime Water, Alkaline Solution, Glycerin Solution, and Boric Acid Solution were tried in addition, with the above expression of opinion.—C.D. i./14,73.

Liquor Caoutchouc (B.P. '98).

Caoutchouc 1, Benzol 10, Carbon Bisulphide 10.

In making this liquor it saves time to treat the rubber with the carbon bisulphide alone for an hour or two to form a jelly, then the benzol may be added and the preparation be ready in 24 hours. May be mixed with:—

Salicylic Acid 5%, Pyrogallic Acid 10%, Boric Acid 5 and 10%, Aluminium Acetate 1%, Ichthyol 5 and 10%, β Naphthol 5 and 10%, Capsicin 1%, Chrysarobin 10 and 20%, Bismuth Subgallate 5%,—whilst 'sticky' dust with a little Talc—thus used the 'patch' is hardly noticeable.

Bandages of rubber are (i.) webbed with strands of rubber; (ii.) Statham's porous; (iii.) Martin's (solid) perforated and non-perforated; (iv.) Elastic Circular Stocking and India-rubber Webbing.

Bed Sheets, rubber, are made with funnel and eyelet holes for attaching

Bladder Irrigators consist of glass douche can with 5 foot rubber tubing with stop-cock and two-way rubber catheter; some have two-way metal pipe.

Bladder Syringes are of 4 or 5 ounces capacity, with glass or brass barrel. Herring's is of rubber with bayonet catch nozzle.

Bougies of solid elastic gum:—

With bulbous end = à Boule, in sizes 1 to 16.
,, ,, silk web ,, ,, 1 to 16
Conical pointed in shape ,, ,, 1 to 12.
Cylindrical, not tapered, various textures and materials—Sizes 1 to 16.
Œsophageal Bougies are bulbous, conical and cylindrical, of elastic gum.—Sizes 10 to 24.

Catheters.—Elastic gum, black and webbed, or silk web—

Bulbous (à Boule), sizes 1 to 16.
Coudé (bent at end) also Bi-Coudé with two bends.—Sizes 5 to 12.
Cylindrical.—Sizes 1 to 15, with or without wire Stilettes, and sizes 5 to 12 with solid or hollow ends.
Conical (simply pointed, *i.e.*, tapered), with wire Stilette.—Sizes 1 to 12.

Catheters, Soft Rubber.—Those in demand are in lengths of 13 and 16 inches respectively. They are supplied with and without funnels, and the sizes vary between 4 and 12.

Belfast linen Catheters are also prepared.

Web Catheters may be sterilised by boiling in nearly saturated solutions of Ammonium Sulphate or Sodium Chloride, washing afterwards in sterile water.

Catheters, Female, are of glass, straight or curved (Queen Charlotte's Hospital), metal, or soft rubber.

Dental Rubber, manufactured of pure para rubber and coloured. This is supplied in various shades of colour, *e.g.*, white, pink, red, orange, black. The varieties in commerce are designated 'Samson,' 'Doherty,' 'Gold Dust,' Ash's 'Whalebone,' and Jamieson's 'Horn.' The rubber is hardened by vulcanisation, and used to form a frame to carry artificial teeth In vulcanising most rubber, especially Ash's, raise the temperature gradually until 315° F. or 100 lbs. pressure is obtained. Maintain this temperature or pressure 75 minutes to complete vulcanising process.

Drainage Tubing is of various dimensions, and is supplied in Carbolised solution in glass tubes.

Elastic Hosiery comprises stockings, socks, knee caps, leggings, thigh pieces, knee hose, thigh hose, anklets, elbow pieces, cuffs, mitts. Measurements should be made from the limb first thing in the morning.

Eye Douches. Bowman's consists of rubber ball, with tubing and mount The Moorfield's Pattern consists of Douche can with tubing.
The "Undine" is a glass flask with pointed spout.

Finger Stalls and **Cots** are made in rubber for digital examination.

Gutta Percha Tissue in ¼ yard, ½ yard, 1 yard pieces, and as required is prepared from Gutta Percha, the dried milky juice of *Palaquium oblongifolium* and other varieties of *P.* (*N.O. Sapotaceæ*). Contains about 80% gutta similar to that of caoutchouc.

Gutta Percha Tissue for dressing wounds.—It may be sterilised by washing in Methylated Spirit. It is applied direct to the wound after cleansing and covered with wool and bandage. It is seen on the third day—if the wound remain clean it is inspected through the dressing (this is of great advantage) and inspected again on the fifth day,—the dressing remains undisturbed until the removal of the stitches on the eighth or tenth day, when a similar dressing is applied and kept in place till cicatrisation is sufficiently established for there to be no danger of infection.—B.M.J. ii./10,622.

Ice or Hot Water Bags for the ear, eye, head (helmet shaped), abdomen, spine, throat (collar shape).

Jaconet, white and pink.

Macintosh or **Waterproof Sheeting,** 44 inches wide (see also **Pegamoid**) is supplied :—

1. Double texture and double width. 2. Having rubber on both sides.

Nasal Douches or **Irrigators** are—

1. Of rubber tubing, with stop-cock for use as a *syphon*.
2. In the form of a *spray bottle* for spraying into the nostrils.
3. *Boat shape*, of glass, with aperture for covering with the finger, and thereby controlling the flow of liquid. This latter form is useful where a small quantity of solution is employed, as in a simple catarrh.
   Woakes' pattern has a rubber nozzle, and is similar.
5. *Syringe form*, consisting of rubber bulb or glass tube with piston, with shaped vulcanite or rubber nasal plugs.

Oiled Calico. Calico treated with boiled oil, and thus rendered waterproof.

Oiled Silk is supplied (*a*) green, (*b*) in the non-adhesive (French) form of yellow colour, and (*c*) a further variety is brown in colour.

Oiled Silk Dextrinized is prepared from the best English Oiled Sil by treating the latter with a solution of Carbolized Dextrin.

Oiled Silk Protective. This consists of oiled silk coated on both sides with copal varnish, and when dry, brushed over with Dextrin 1, Starch 2, Carbolic Lotion (1 in 20) 16.

Operation Gloves are made in thin, medium and heavy weights (rough and smooth).

Pessaries are ball shape, butterfly, circular, oval, cradle, and ring form.

Plasters, Spread :—
India Rubber, Adhesive, 7 inches wide, 1 yard and 5 yard rolls.
India Rubber Adhesive, Porous, 1 yard rolls.
" " (Mead's) Tapes, ½ ¾, 1, 1½, 2, 2½, and 3 inch, in both 5 and 10 yard lengths.

Stomach Tubes.—That known as Van Valsh's, with bevelled "Velvet Eyes," is considered one of the best but the bevelling may have the disadvantage of weakening the tube on one side and causing it to turn round when an obstruction is met. For passing the tube a special Lubricant Glycerin Jelly is supplied in Collapsubes, or a Glyco-Gelatin Pastil of Menthol $\frac{1}{12}$, and Cocaine $\frac{1}{20}$, is useful. (*Vide* Examination of Stomach Contents.)

Sutures (*vide* Ligatures).

Syringes—

1. Vulcanite and glass with rubber nozzle, "Glycerin" Injection.
2. India-rubber ball with soft rubber nozzle in one piece (ear and nose)
3. Rubber ball with bent glass nozzle (ear and nose).
4. Ball with conical vucanite nozzle (Injection "Bottle").
5. Ear: Barrel shaped of glass or brass.
6. Enema, for rectal injection and vaginal douching.
7. Durham's back-flow syringe in ¾ oz. and 1½ oz. sizes.
8. All-rubber urethral syringes 1, 2, 3 and 4 oz. capacity.
9. Janet's wound syringes are useful for bladder irrigation, in glass and metal also in all metal, usual capacities are 2, 3 and 4 oz.

Urethral, rubber ball ½ ounce size, with bone pipe or elastic gum, short or long (Golding Bird's is a special form). See also Hypodermic Syringes.

Intra-laryngeal, with three apertures to ensure full distribution of fluid.—L. i./05,97.

CAPSICI FRUCTUS (*Off.*). U.S.

Dose.—½ to 1 grain (0·03 to 0·06 Gm.), in a pill.

The dried ripe fruit of *Capsicum minimum*, *C. fastigiatum* (*Solanaceæ*), Cayenne pepper is from Nepaul.

Contains as chief constituent Capsaicin—formula variously stated.

Capsicin.

Dose.—$\frac{1}{20}$ to $\frac{1}{10}$ grain (0·003 to 0·006 Gm.).

Made by extraction with 90% Spirit. It is a dull reddish brown oily mass becoming crystalline. *c.f.* Umney, P.J. ii./13,594.

Gerrard found that Alcohol 90% is a good menstruum for extraction. He prepares a 2 in 1 liquid extract, and from this an ointment 1 in 10 with the official basis or hydrous lanolin, also a plaster 10%.

Oleo-Resina Capsici, U.S.

A bright red oil obtained by exhausting with ether, distilling off the greater portion of it; allowing the remainder to evaporate spontaneously in a warm place. Pour off the liquid portion, transfer the residue to a glass funnel, with a plug of cotton wool, and, when the fatty matter (to be rejected) has been completely drained, mix the liquid portions.

1½ of acetone will exhaust (if percolated slowly) 1 of capsicum. Yield of oleo-resin 5 to 16%.—Caspari.

Umney held that Capsicin is not synonymous with the Oleo-Resin. —P.J. ii./13,594.

Pilula Capsici Composita.

Capsicum Oleo-resin ½ minim, Clove Oil ½ minim, Calomel 1 grain, Aloes 2 grains. For the atonic stomach of drunkards.—H.

Ⓟ **Emplastrum Capsici.** (Ⓟ *c.f.* Emp. Plumbi).

Evaporate the Alcohol from Liquid Extract of Capsicum 10, and stir into Resin Plaster 95. Contains 5% of Solid Extract (Gerrard). U.S. has Oleo-Resin of Capsicum 0·25 Gm. brushed over 15 square Cm. of adhesive plaster.

Capsicum plasters in rubber combination are also made in sheets 7 in. by 5 in., and yard rolls 7 in. wide.

Emplastrum Capsici Mite (**Mild for dental use**) R.D.H.

Caoutchouc 10, Yellow Paraffin 1. Heat carefully so as to just liquefy and add Resin 10, Powdered Orris Root 4, Finely Powdered Capsicum 4. Mix and spread on linen and cut into pieces half the size of finger nail. Dry the gum thoroughly before application.

Emplastrum Capsici Forte, R.D.H.

Prepare as above omitting the powdered Capsicum.

Spread and brush the surface thinly with Oleo-Resin of Capsicum *q.s.* (Neither of these plasters contains lead.)

Fluidextractum Capsici, U.S., VIII.

Dose.—1 minim (**0·06 Cc.**) Alcoholic Percolate 1=1. Gerrard favours the following formula :—

Exhaust Capsicum 100 in fine powder (No. 60) by percolating with 90% Alcohol, distil off alcohol until the residual extract weighs 50,1 of extract=2 of drug, *i.e.*, double the strength of the U.S. preparation.

Unguentum Oleo-Resinæ Capsici.

Oleo-resin of Capsicum 1, Hard Paraffin Wax 1, White Soft Paraffin 8. Melt the paraffins, add the oleo-resin, and stir until cold. For use as the liniment.—P.J. ii./11,630. May be too strong for tender skins—will bear dilution 2 or 3 times.

Gyrol Pencils.—A French specialty possessing the revulsive properties of Capsicum.

Tinctura Capsici (*Off.*). 1 in 20 of 60% alcohol. U.S. 1 in a mixture of Alcohol (94·9% vol.) 95 and Water 5, *q.s.* to 10.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Given internally it increases the flow of saliva and gastric juice. It also increases the peristalsis of the intestine, relieves atonic dyspepsia, and is useful in dipsomania—it allays the craving for alcohol. *c.f* Mistura Capsici Sedativa, *infra*. The official tincture is too weak for external use as a rubefacient.

Filariasis is treated prophylactically by Pepper and Capsicum. Tincture of Capsicum found useful in acute filarial fever and lymphangitis.—J. A. Robertson, L.ii/15, 673.

Tinctura Capsici Ætherea.

Prepared as official tincture, with pure ether *vice* alcohol,—L i./90, 1066.

Tinctura Capsici Fortior, B.P.C.

Dose.—1 to 3 minims (**0.06 to 0.2 Cc.**). Principally used externally. *Is practically identical with Concentrated Tincture of Capsicum* (Turnbull).

Capsicum in No. 80 powder 1, Alcohol (90%) *q.s.* to 3. Is useful for chilblains but only when the skin is not broken.

This is too irritating generally. The writer's formula is :—

Linimentum Capsici. Adopted, in altered form by B.P.C.

Capsicum Fruit in No. 80 powder 10, percolate with Alcohol (90%) to 70, and add Oleic Acid 10, Oil of Lavender ½. Painted on the skin, or applied sprinkled on piline or flannel, in an hour it produces a red glow : its action may be arrested by smearing the part with vaseline. Useful in chest affections, rheumatism, sciatica, &c. Does not redden the skin for any length of time, hence may be used on exposed parts

Linimentum Capsici Duplex is the latter (the author's preparation) double strength.

Mistura Capsici Sedativa (anti-alcoholic).—L.H.

Dose.—½ ounce (**15 Cc.**) containing Capsicum Tincture 5 minims, Tincture of Ginger 20 minims, Potassium Bromide and Sodium Bicarbonate each 10 grains. Decoction of Cinchona to ½ ounce.

Unguentum Capsici (*Off.*) is about same strength as **B.P. '98,** but basis is altered.

Resembles Smedley's Chillie Paste.

The following formula (Gerrard's) is not wasteful of the fats:—

Liquid extract of capsicum (1=2 of drug, Gerrard) 60 grains, olive oil 1 ounce, spermaceti 60 grains, melt the fats and stir in the liquid extract. A more absorbent ointment would be liquid extract of capsicum 60 grains hydrous lanolin 1 ounce 60 grains.

Capsicum Wool, Calorific Wool.—Oleo-resin of Capsicum 1, Ether 30, Absorbent Cotton 19. Dissolve the oleo-resin in the ether, saturate the wool evenly with the solution and dry.

Alternative formula (Gerrard):—

Dissolve liquid extract of capsicum (Gerrard) 2 ounces in alcohol 90% 7 ounces. Pour the solution on to the cotton wool 9 ounces under pressure to saturate evenly. Dry and preserve in well closed cartons. Contains 10% extract. Colour with eosin, as otherwise the colour fades. Cover with oiled silk when applying to increase activity.

✱**Capsogen** (T.M. 327250) is a trade variety of the above encased in gauze.

Capsicum Gamgee Tissue is also made.

All the above are very useful in rheumatic affections, bronchial and similar painful complaints where warmth relieves.

CASCARA SAGRADA (*Off.*) U.S., etc.

Syn.—Sacred Bark.

The dried bark of *Rhamnus purshiana* (*Rhamnaceæ*).

Dose.—3 to 15 grains (**0.2 to 1 Gm.**) in cachets.

In spite of much research the active constituents of Cascara representing the effects of the drug cannot be succinctly defined. In Vol. II. we provide much scientific information on this matter. *Off.* requires the bark to be kept one year before use.

Cultivation in British Isles. Trials have been made at various stations. About 35% of the seeds planted in 1908, amongst the most successful trials, were fertile. The seeds should be removed from the stiff pulp (dried fruit). Seems to prefer light to heavy soil. Can be raised by cuttings 3 to 4 inches long. Bark should be removed between end of May and end of August.—P. i./13,720; see also P.J. i./09,175; and E.P. Edn., XV., p. 259.

Flavoring.—See Extractum Cascara Liquidum.

Uses.—Cascara acts as a vegetable bitter, increases peristalsis, empties rectum, is useful for internal piles, and is a good laxative in habitual constipation.

For dosage in correcting constipation see Liquid Extract.

Patients subject to uric acid gravel may sometimes find Cascara Sagrada of service.—Tirard, Med. Treatment.

Cascara Capsules ('**mild**') represent half a drachm of Liquid, or about 6 grains of Solid Extract. Capsules ('**strong**') of **double this strength** are also prepared.

Dose.—1, 2, or more. The mild are also prepared with 1 grain **Euonymin** in each in addition. *Dose,* 1 or 2 at bedtime.

Cascara Jelly

Dose.—1 to 4 drachms, equivalent to Cascara Extract ½ to 2 grains. Suitable for the treatment of habitual constipation.

The agar-agar basis renders the fæces more voluminous and richer in water. The Cascara Extract produces the stimulating action on the bowels. The preparation is agreeably flavoured, but if desired the jelly may be taken with a little jam.

Cascagar.—*Martindale.*

Dose.—1 teaspoonful up to 2 tablespoonsful to be taken with stewed apple or other moist food.

A preparation of flaked Agar with Cascara Extract flavored with Lemon. It increases the volume of the fæces, at the same time giving the necessary moisture.

Syrupus Cascara Aromaticus (*Off.*). *Syn.* **Elixir of Cascara B.P C., 1894.**

Agreeably flavoured with Orange and Cinnamon.

Contains 40% of Liquid Extract of Cascara.

Dose.—½ to 2 drachms (**2 to 8 Cc.**). Very small doses three times a day are pleasantly laxative.

Extractum Cascara Sagrada Siccum (*Off.*).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**) in pill.—An aqueous extract (*Cascara Sagrada* is indeclinable, being Spanish and not Latin).

U.S. IX. 1=3 of drug by extraction with boiling water, powdering and finally adjusting with starch and magnesium oxide. Fr. Cx. extracts with 60% alcohol.

Extractum Cascara Sagrada Liquidum (*Off.*).

Dose.—30 to 60 minims (**2 to 4 Cc.**).

An aqueous extract containing 25% of alcohol (90%) *i.e.*, the spirit strength is increased, this is an advantage. That of B.P. '98 we found to deposit on keeping, and to ferment in hot climates ; we prefer alcohol (20%) as a menstruum. With this a more active preparation is formed. It may be made miscible with water by the addition of half its volume of sal volatile.

110 minims on evaporation on a water bath for 4 hours should yield not less than 20 grains of residue.

P. Belg. is similar. **P. Jap.** makes with Alcohol 90% and Water equal parts. **Fr. Cx.** with Alcohol 50% 1 = 1 by weight. **Fluidextract U.S.** 1 = 1 by percolation with hot water evaporating and adding 25% of alcohol (95% vol.).

The following formula has been suggested (*c.f.* Glycetracts) :—

Moisten Cascara 20 ounces with Water 15 ounces, and set aside 6 hours, pack loosely in percolator and percolate with more water to exhaustion. Evaporate percolate to 12 ounces, cool and add Glycerin 8 ounces, allow to stand, filter and add to the filtrate Strong Solution of Ammonia 80 minims. Without the Ammonia the preparation became turbid. The Glycerin re-dissolves some of the matter thrown out on heating, hence probably the supposed increased laxative action of a Glycerin Extract. The Glycerin Solution above mentioned filters easily. J H. Franklin.—P.J. ii./07,114.

Acetic Acid extracts Cascara satisfactorily.—Y.B. 1899.—P.J. ii./09,142

Use in Constipation.—

It is best to take advantage of its tonic properties and avoid its purgative action. The initial dose depends on the individual, but it must be correctly found—15 to 20 drops *t.d.*, suffices for the adult. The object is to procure one motion only a day. The dose that is sufficient must be taken in a wineglassful of water thrice daily after meals for a week or ten days, or until the action becomes somewhat too pronounced. Then reduce dose by one drop only and take with same regularity as before. In time it will be found that 1 drop in water thrice daily after meals will be sufficient Finally the medicine may be omitted altogether.

Constipation in a child will often be relieved by one to three drops in a drachm of syrup one to three times a day.—Gordon Sharp, Pr. Mar., 1913.

Flavoring.—Syl Lavandulæ, Syl Vanillæ, Extractum Glycyrrhizæ Liquidum, *v.* also Syrupus Cascara Aromaticus.

Orange, Coriander, Anise, Cassia and Liquorice all mask the unpleasant taste of Cascara.

Fluidextractum Cascaræ Sagradæ Aromaticum, U.S.—*Average dose.*—30 minims (2 Cc.) 1=1. Made by percolating the drug mixed with magnesia with boiling water, evaporating and adding several flavoring agents. Sometimes called "Aromatic Cascara" in the States. The magnesia is said to destroy the bitter taste

Extractum Cascara Aromaticum Liquidum.—*Cowley.*

Dose.—30 to 60 minims (2 to 4 Cc.).

Cascara Sagrada (No. 20 powder), 20 ounces, Diluted Sulphuric Acid, ½ ounce, Alcohol (90%), 4 ounces, Oil of Coriander and Oil of Orange, of each 20 minims, Spirit of Chloroform, 80 minims, Gluside (soluble), 13 grains, Liquid Extract of Liquorice, 4 ounces, Solution of Ammonia and Distilled Water, *aa. q.s.*

Boil the cascara with 7½ pints of distilled water and the diluted sulphuric acid for two hours; allow the mixture to stand 24 hours, then pack in a percolator and exhaust with distilled water. Neutralise the percolate with ammonia, and evaporate on a water bath to 12 ounces maintainimg slight alkalinity throughout the operation by the further addition of ammonia from time to time. Dissolve the oils and gluside in the alcohol, and add the spirit of chloroform and the liquid extract of liquorice. Mix this with the concentrated percolate, and if necessary make up to 20 ounces with distilled water

The activity of Cascara may be due to decomposition products of one or more glucosides, hence the use of acid. The product is elegant and active.—C.D. ii./11,115

Unofficial solid Extract of Cascara has been made by boiling the bark with water—by this process a large amount of resinous matter reaches the final extract. The resinous matter is practically tasteless and probably has little therapeutic activity. It is possible that this method of Cowley splits up the resinous matter into active bodies.

✱**Kasak** (T.M. 90413).—*Dose* for children, 1 or 2 drachms; for adults, ½ ounce. A laxative free from the bitterness of Cascara Bark.

Kasena.—*Dose* as last, is the same with Senna. Kasena Capsules are also made.

Mistura Cascara. Gt. Orm. H.

Liquid Extract of Cascara, Liquid Extract of Liquorice, Syrup of Orange Peel, Chloroform Water, of each 15 minims for one dose.

Ⓟ **Haustus Cascara Sagrada Compositus,** Vic. Park.

Liquid Extract of Cascara 1 drachm, Hyoscyamus Tincture ½ drachm, Tincture of Nux Vomica 10 minims, Aromatic Spirit of Ammonia 1 drachm, Magnesium Sulphate 1 drachm, Syrup of Ginger 1 drachm, Water to 1 ounce.

Mistura Hepatica. *Dose.*—1 to 2 drachms in water. Liquid Extract of Cascara 20, Tincture of Jalap 20, Tincture of Podophyllum 10, Compound Tincture of Gentian 10, Chloroform Water 50, Sal Volatile 10.

Pastils of Cascara each contain 2½ grains of Extract, and are coated with Tolu. *Dose.*—1 or 2.

Ⓟ **Pilula Cascara Composita.**

Extract of Cascara 1½, Extract of Nux Vomica, Alcoholic Extract of Belladonna (B.P. '98), of each ⅛, Milk Sugar 1. In grains for one pill, or in grammes for fifteen, each pill weighing 3¼ grains.

Dose.—One before dinner or at bed-time.

Is an agreeable and efficient aperient, has certain and gentle action continuing beyond the first day; good for liver inaction. **Tablets**, plain or sugar coated, 1, 2, 3, 4, and 5 grains.

Dose.—1 or more according to strength.

Tinctura Cascara Sagrada.

Percolate 1 to 5 with Alcohol 60%.

Laxative dose.—10 to 60 minims (0·6 to 4 Cc.).

Ⓟ Tinctura Laxativa.

Dose.—20 to 60 minims (1·2 to 4 Cc.).

Liquid Extract of Cascara Sagrada 2, Aromatic Spirit of Ammonia 2, Spirit of Chloroform 2, Tincture of Belladonna 1, Tincture of Nux Vomica 1. This is an agreeable and elegant form of administering cascara, being miscible with water.—B.M.J. ii./93,596.

Trochisci Cascara Sagrada et Olei Menthæ Piperitæ.

These are made with fruit basis, contain 2½ grains of Extract flavoured with Peppermint, and are useful correctives. *Dose.*—1 or 2.

Vinum Cascara.—*Martindale.*

Dose.—½ to 1 ounce (15 to 30 Cc.).

Liquid Extract of Cascara 1, Sugar 1, Aromatic Elixir 1, Sherry to 20. Mix and decant from any sediment which may form on standing.

Mucogene. $C_{18}H_{15}N_2O_2Cl$ = 326·69. *Dose.*—2 to 3 Capsules at bedtime. An anthraquinone derivative employed in capsule form, each containing 0·1 Gm., in habitual constipation. Said to be specific.

Synthetic purgatives derived from Anthraquinone are liable to be absorbed and in addition to purgation to produce back-ache, pain, albuminaria and other renal symptoms—better give such substances in the crude form, *i.e.*, in the form of rhubarb, senna, cascara, etc.—P.J. ii./11,15.

CATHA EDULIS.

Dose.—1 drachm to ½ ounce (4 to 15 Gm.) infused in about 6 to 8 ounces of hot water as required. A sprig of about 10 leaves weighing about 10 grains is chewed at a time by natives.

The leaves of this plant are known locally as Kat or Khat. It is a shrub about 12 feet high growing wild in Abyssinia and along the East Coast of Africa. It is cultivated for native use in Arabia. The leaves are serrated at the margin and vary from about 1 to 3½ inches in length. Their taste is slightly astringent, and at the same time sweet and strongly resembling licorice.

Note.—We have found the leaves to vary considerably morphologically. A sample recently to hand kindly identified for us by E. M. Holmes was on average 2½ inches long and distinctly narrow with serrations more marked than usually seen.

Three alkaloids have been isolated by R. Stockman—*Cathine* (very soluble in water), *Cathinine* (not very soluble in cold, but more so in hot), and *Cathidine* (insoluble).

Pharmacology.—In its action on the nervous and muscular system of the frog, the action of CATHINE resembles that of a combination of the actions of Morphine and Caffeine, while CATHININE has not the same drowsy or depressing action on the brain, but is more stimulant to the spinal cord. In large doses both paralyse the terminations of motor nerves. CATHIDINE is a muscle poison and a slight stimulant to the nervous system In man they all act chiefly on the cerebrum and spinal cord, causing stimulation or much excitement according to dose, and Cathine alone induces slight drowsiness at first.

Uses.—The varying effect of the drug as used (chewed) by the Arabs—either to dispel or induce drowsiness, may be due partly to the dose and partly to the preponderance of one or other of the alkaloids or their decomposition products. It has been known for generations for its sustaining power. The activity of the leaves when used in an infusion in the same manner as tea or coffee, or when chewed, is stated to cause 'staying power,' wakefulness and refreshment.

Extraction of the alkaloids.—P.J. ii./12,675,676,683. See also J.C.S.A. ii./12,480.

As Cathidine is so insoluble in water the infusion, as drunk in Abyssinia, must depend for its action on *Cathine* and other alkaloids or decomposition products which may be present. When the leaves are chewed it is probable that a certain amount of the insoluble Cathidine is obtained from them, but its action must be slight as the alkaloid itself in large doses had little effect on cats or rabbits.

Broadly viewed the action of Kat may be taken as essentially comparable to that of other vegetable products used by mankind as stimulant-narcotics.

The drug, according to the Arabs, is thought to have power in strengthening the action of the bowels.

Catha Preparations.

Extractum Cathæ.—*Dose.*—2½ to 10 grains (**0·18 to 0·6 Gm.**).

We have prepared a solid extract with 60% Alcohol, 1=4 of leaves for use in pill or tablet form.

Extractum Cathæ Liquidum. *Dose.*—1 to 5 minims (**0·06 to 0·3 Cc.**). Strength 2=1, prepared with Alcohol 60%.

This preparation should be recently made.

Effervescent Catha and Phenolphthalein.—*Martindale.*

Dose.—1 to 2 teaspoonsful in ½ tumbler of warm water a good ½ hour before breakfast.

A tonic laxative combining the effects of the active principles of Catha with the mild purgative properties of Phenolphthalein.

Tablets of Catha Extract contain 2½ grains of Solid Extract. *Dose.*—1 to 4.

Catha, Milk and Glycerophosphate.—*Martindale.* *Dose.*—A tablespoonful in a small cupful (4 to 5 ounces) of hot water.

This preparation is of the same composition as the Milk and Glycerophosphate with an addition of Catha. Forms an agreeable beverage.

Catha Cocoa Milk. *Dose.*—1 tablespoonful, mixed with a small cupful of hot, nearly boiling, water, twice or thrice daily or as required.

Substantially a breakfast Cocoa with Catha in addition.

CEREVISIÆ FERMENTUM.

Syn. Fæx Medicinalis. *Dose.*—½ to 1 ounce (**15 to 30 Gm.**).

The cells and spores of *Saccharomyces Cerevisiæ.*

All fermentations produced by living organisms (as in the case of yeast fermentation of sugar) are caused by definite chemical substances—ferments—produced in the cells of the organism. The ferment from the yeast cell was extracted in 1897 by precipitating yeast juice with 10 times the volume of Acetone, centrifugalising and washing the sediment with Ether and Acetone, and drying over Sulphuric Acid.

The phenomenon of Alcoholic fermentation, according to Harden, "is one in which an enzyme and a co-enzyme, a second enzyme-hexose-phosphatase, and in addition sugar, phosphate and the hexose-phosphate formed from these" are concerned. Harden and Young discovered that a soluble Phosphate markedly increases fermentation. Harden says, "In the case of the living yeast it may be conceived that the sugar which has diffused into the cell unites with the fermenting complex and undergoes the characteristic reaction with Phosphate. already present in the cell, yielding Carbon Dioxide, Alcohol, and Hexose-phosphate," the latter is then decomposed and the liberated Phosphate again enters into reaction.—B.M.J. ii./11,22.

The fermentation of sugar can be effected by finely divided metals, *e.g.*, platinum. This goes to show that enzymes are catalytic agents. See also Nature, Mar 3/10,28.

Fæxin, * **Furonculine** (T.M. 251553), **Levurine** and **Zymol** are special dry powdered yeasts. *Levuretine is T.M. 272020. Pills and tablets of Fæxin Extract, *v. infra.*

Dose of any of the above.—A teaspoonful with meals in water, beer, or milk.

Manufacture.

The Acetone method of drying consists in treating the yeast with repeated quantities of Acetone, pressing off and then treating with Ether and finally drying at not exceeding 45° C. Another method is to work in a partial vacuum over Sulphuric Acid at 42° C. (108° F.). Spread the Yeast in very thin layers.

See also C.D. i./10,295.

Uses.—Added to poultices for application to unhealthy and sloughing wounds. Internally both fresh yeast and the dried form are given to check boils and for acne; by some they are considered to be a good remedy for diabetes, enabling patients to take more carbohydrates (*vide* Medical Annual, 1899 and 1902 for experimental support). It is said that fresh yeast given *per os* grows actively in the stomach and slightly reduces sugar in this affection. Yeast has been used for constipation as also in tuberculous affections and in dysentery.

The action of Yeast is not due simply to the property of inciting fermentation, as it is still effective after the yeast has been heated to 130° for an hour. Its action is virtually that of Nuclein.—B.M.J. i./15, 704.

Fæxin is a decided 'anti-Staphylococcic agent'—in cases of dyspepsia due to swallowing naso-pharyngeal pus, it acts gastrically, and probably by *direct* contact, as an antidote. It not only checks vomiting, but *after* 14 to 21 days' usage it will be noted that the patient loses the icteric complexion, and gets a healthy colour in the face. It takes some time to show *full* effects.—Campbell Williams.

Glycogen 5% (equivalent to 25% of the dried material) is a constituent of yeast.—Pavy and Bywaters Jl., Phys. Nov. 29'07.

Phthisis treated, with influence on opsonic index. There is an increase in leucocytes in the blood on giving yeast—said to be due to the Nuclein.—L. i./05,1493.

Phlyctenular keratitis cured by 4 Gm. doses daily of dry beer yeast with customary local applications.—Oph., May, 1906,302.

Burns well treated by either fresh or dried yeast made into a paste with tepid boiled water on sterile gauze bandages. Pain is relieved almost instantaneously. Suppuration never occurs, nor cicatricial deformity.—B.M.J.E. ii./08,16.

For the peripheral neuritis of mediterranean fever, yeast has been recommended in doses of two drachms, twice daily. (*c.f.* VITAMINES) Review of Tropical Diseases Pr. Aug., 13,218.

Fæxin Extract. *Syn.* **Extractum Cerevisiæ Fermenti.**

By extracting fresh Yeast with Alcohol we obtain about 3% of oily extractive matter. This has been used for the various affections for which fresh and dried Yeast is employed, *e.g.*, in acne, erysipelas, furunculosis, folliculitis, leucorrhœa, diabetes, conjunctivitis phlyctenulosa, typhoid and acute articular rheumatism.

Fæxin Extract Pills and **Tablets** contain 3 grains (0·2 Gm.).

Manufacture of Commercial Yeast Extracts by hot water or ether and water extraction. Qualifications of these as articles of food.—B M.J ii./08,451

Yeast Preparations as Foods *see Vol. II.*

Nuclein.—*Syn.* **Nucleol.**

Dose.—15 grains (1 Gm.) several times daily.

Tablets, 1 grain (0·06 Gm.).

Is considered to be a compound of Nucleinic Acid with Albuminates and Carbohydrates. It tends to stimulate formation of white blood corpuscles, and hence to act as a bactericide. Septicæmia has been treated with it. Its subcutaneous injection is said to raise the opsonic power to an infecting organism. — De Backer's mode of treating tuberculosis. Cancer treated with theoretical grounds.—B.M.J. ii./09,1217.

Acidum Nucleinicum.

White powder somewhat soluble in water in the presence of a sufficiency of Sodium Hydroxide or Potassium Acetate. Its solution is acid to litmus paper. Insoluble in Alcohol. 5% aqueous solutions made with Alkali have principally been utilised.

Commercial Nucleic Acid should contain not much less than 15% Nitrogen and 9% organic Phosphorus on the dry material.—A. C. Chapman, Analyst, 1918, 43, 259; see also Y.B.P., 1919, 148.

Dose.—15 minims (1 Cc.) of this solution hypodermically. (**Sterules, Hypodermic**, contain $\frac{3}{4}$ grain in 15 minims). *Per os* $\frac{1}{2}$ to 2 grains.

Sodium Nucleinate.—May be prepared from yeast by treating same warm with Sodium Acetate Solution 10% strength containing 1·65% Sodium Hydrate. Concentrate the liquor, neutralise with Acetic Acid and precipitate the Sodium Nucleinate with Alcohol, (Neumann).

Has been used in treatment of anæmia, scarlet fever and puerperal fever, also in tuberculosis.

Hypodermic Injection of 0.4 Gm. Sodium Nucleinate in 40 Cc. of Normal Saline increases leucocytosis, and also the resistance of the patient in typhoid.—Pr. Sept. 1907,438 ; M.A. 1908,31.

To produce hyperleucocytosis in the treatment of general paralysis, Donath uses the following solution :—

Sodium Nucleinate 2, Sodium Chloride 2, Water 100. He recommends 7 injections at intervals of 5 days, the first being 50 Cc., and subsequent 100 Cc., injected into subcutaneous tissues. If a febrile condition is not produced larger doses up to 180 Cc., may be used. The author of the paper, however, has not had success with the method.—W. H. B. Stoddart, M.P.C. i./14,331

Bismuthi Nucleinas. *Dose.*—20 (**1·2 Gm.**) to 40 grains (**2·5 Gm.**). Yellowish powder containing 50% Bi. Insoluble in water and in dilute acids, splits up in the intestines, hence used as astringent for chronic intestinal catarrh. Was used on children under 2 years of age, also in cases of tuberculous diarrhœa with benefit.

✱**Nargol** (T.M. 228097), ✱**Mercurol** (T.M. 228096) and **Cuprol** are compounds of Nucleinic Acid with respectively Silver, Mercury and Copper. Cuprol and Nargol are of use in granular ophthalmia in the form of 5% instillations. Nargol is soluble in water 1 in 4. Contains about 10% Ag.

Nargentol is stated to be a silver nucleinate.

Ⓟ CHLORAL HYDRAS (*Off.*). U.S., P.G.V., P. JAP., P. HELV.

$C\,Cl_3.CH.(OH)_2=165{\cdot}414.$

TRICHLORETHYLIDENE GLYCOL.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in aqueous solution, or in chloroform water well diluted. FR. CX. has *maximum single dose* 60 grains, during 24 hours 180 grains approximately.

Manufacture.—This compound is obtained by the action of dry Chlorine upon Alcohol. Chloral-alcoholate, the principal product of the reaction, is then decomposed with Sulphuric Acid. Chloral thus produced is hydrated by bringing it in contact with the necessary quantity of water, warming to about 50° C., and allowing it to cool.

A note on the procedure.—C.D. ii./14,336.

Soluble 4 in 1 of water, 5 in 1 of alcohol, 2 in 1 glycerin, 2 in 1 of ether, and 1 in 3 of chloroform, likewise soluble in oils and fats.

Flavoring.—Glyl Rosæ, Glyl or Syl Sassafras, Syl Amygdalæ Amaræ ; Syrupus Aurantii Floris.

Uses.—As a hypnotic, it is often combined with opiates, morphine or bromides, but it is incompatible with quinine. Its use is contra-indicated in heart affections, Bright's disease, and when the vital force is very weak. Its sedative action resembles that of chloroform.

Severe chorea has been treated by inducing prolonged sleep with its aid.

In epilepsy small doses may be efficacious.—L. i./09,908.

Recommended as a deodorant for sputum.—Pres. 1910, p. 5.

Antidotes to Chloral.—Keep patient awake, apply strong ammonia to nostrils. Stomach pump or emetics (zinc sulphate 20 grains), followed by amyl nitrite, coffee, electricity, oxygen picrotoxin, or strychnine. It is useful as an antidote to poisoning by strychnine.

(For Antidotes to ***Chloral*** when in ***conjunction*** with ***Morphine*,** see **Antidotes to Poisons.**)

Should be expunged from the list of hypnotics, cheapness its only advantage.—B.M.J. i./09,555.

Incompatible with alkalis, ammonium salts, potassium iodide or permanagate, and with bromides in presence of alcohol,—chloral-alcoholate may separate. Liquefies with camphor, *q.v.*

Chloral is incompatible with magnesia, *e.g.*, in the prescription :—

Syrup of Chloral 1 ounce, Magnesia Ponderosa 1 drachm, Ipecacuanha Wine 1 drachm, Belladonna Tincture 1 drachm, Water to 6 ounces, results in rapid formation of Chloroform and Magnesium Formate thus $2\,CCl_3CH(OH)_2 + Mg\,O = 2CHCl_3 + Mg\,(COOH)_2 + H_2O$. The alkali also liberates the Belladonna Alkaloids.—P.J ii./11,257, L. i./11,635.

Tetanus, recovery from, under large doses of chloral.—Pr. xlvii.132; B.M.J. ii./01,475 ; ii./04,1460.

In asthma chloral hydrate 30—40 grains is often useful.—Yeo.

In puerperal eclampsia—control of fits by Chloral and Morphine regarded in France as almost specific—increasing dosage :—

1st hour, Morphine Hydrochloride ¼ grain hypodermically ; 2nd hour, Chloral 30 grains, *per os* or *rectum* : 3rd hour, Morphine ¼ grain, hypodermically; 7th hour, Chloral 30 grains ; 13th hour, Chloral 25 grains ; 21st hour, Chloral 25 grains —B.M.J. ii./12,1128.

Sea-sickness. Drachm doses of a mixture of 2 drachms of the syrup with 30 grains ammonium bromide, made up to 1½ ounces with water.—B.M.J. ii./04,1405.

Examination, method of titration.—Y.B.P. 1900, p. 92.

Preparations.

Ⓟ **Chloral Camphoratum,** B.P.C. (Pigmentum Chloral et Camphoræ, T.H.).

Chloral Hydrate 1, Flowers of Camphor 1. Sp. Gr. 1·223.

Combine in a warm mortar. It remains liquid at ordinary temperatures, and forms a valuable application painted on painful parts in neuralgia and rheumatism. It mixes freely in alcohol, ether, oils and fats, but the camphor is precipitated on adding to water or glycerin. Cocaine 10% or less may be incorporated.

The compound (chloral and camphor) dissolves the alkaloids atropine, morphine, and veratrine to the extent of 1 in 30 or more, but their salts are less soluble in it. Liquefactions of a similar kind take place on mixing and gently heating respectively chloral hydrate 1 with menthol 1, or phenol 3, or thymol 1. Quinine salts and chloral hydrate also form liquid combinations.

Chloral, Glycerin and Glacial Phosphoric Acid, equal parts placed in the alveolus after dental extraction will soon stop the pain—the mixture is strongly antiseptic.—Pres. Jan. 07.

In fibrositis the mixture of chloral hydrate, camphor and menthol is found to be satisfactory. Painted over the part, then gently rubbed in with the fingers.—A. P. Luff, Clin. Jl., Oct. ii./05.

Ⓟ **Pigmentum Chloral Compositum**—W. H. has Chloral Hydrate 1, Menthol 1, Thymol 1, Camphor 3.

Linimentum Chloral Compositum.—R.D.H. is the same.

L.H. has Chloral Hydrate, Menthol, Camphor of each 1.

Ⓟ **Chloral Tannin Solution.**—*Syn.* CAPTOL.

Chloral Hydrate 1, Tannin 1, melt together on water-bath and dissolve in water, *q.s.* to produce 8. For strengthening the hair.

Ⓟ **Liquor Bromo-Chloral Compositus.** B.P.C., 1901.

Dose.—½ to 2 drachms (**2 to 8 Cc.**). 1 drachm contains nearly 1 grains each of Chloral Hydrate and Potassium Bromide.

Chloral Hydrate 1,600 grains, Tincture of Indian Hemp 400 minims, Tincture of Fresh Orange Peel 400 minims, Henbane Juice 1,600 minims, Syrup 3¾ ounces, Liquid Extract of Liquorice ½ ounce. Dissolve, add Potassium Bromide 1,600 grains dissolved in Distilled Water 7 ounces. Filter and add Distilled Water to 20 ounces.

Resembles the American hypnotic Ⓟ ***Bromidia** (T.M. 45813), which is stated to contain in each drachm chloral hydrate 15 grains, potassium bromide 15 grains, extracts of cannabis and of hyoscyamus ⅕ grain each.

Dose.—½ to 1 drachm in syrup or water.

Ⓟ **Enema Chloral, L.H.** Chloral hydrate 10 to 40 grains, starch enema to 4 ounces.

Ⓟ **Suppository of Chloral.**

Chloral Hydrate 5, Oil of Theobroma 10. In grains, for one suppository, in grammes, for fifteen. Press into moulds. Heat must not be applied. It is useful in infantile convulsions, where nothing can be administered by the mouth. It should be forcibly retained for a few minutes with the finger, if necessary. It is locally irritating.

Sea-sickness treated by 20 grains per rectum.—B.M.J. i./05,1090.

Ⓟ **Syrupus Chloral** (*Off.*). *Dose.*—½ to 2 drachms (**2 to 8 Cc.**).

Chloral Hydrate and Water *a.a.* 20% in Syrup.

Ⓟ **Tablets of Chloral,** 5 and 10 grains (**0·3 and 0·6 Gm.**) to *be dissolved—not swallowed whole, might blister.* *Dose.*—1 or more.

Chloralamide. *Syn.* **Chloral Formamidum** (*Off.*)

$CCl_3CH(OH)NH.COH = 192{\cdot}437$.

Dose.—15 to 45 grains (**1 to 3 Gm.**) in weak spirituous or acidulated solution. *Max. single dose* 4 Gm. Max. in 24 hours 8 Gm.

PATENT: 7391/1899 ***Expired.*** TRADE MARK: A *device* with name and address was registered 95188/1890, renewed 1903 and 1918.

In colourless inodorous shining crystals with a faintly bitter taste.

Manufacture.—By combining anhydrous Chloral 147 with Formamide 45 and recrystallising from Alcohol about 70%—care being taken not to heat above 55° C.; soluble about 1 in 20 of water, 1 in 2 of alcohol. Must not be heated over 55° C. It melts at 114–115° C. Incompatible with alkalis.

The toxicity of a brand of Chloralamide made by the author, August, 1916, was tested by a physiological expert and found to be less than that of Chloral Hydrate and not greater than that of the Chloral which it would yield on hydrolysis. It appeared therefore to be a safe hypnotic. The details showed that up to 70 mgr. per 100 Gm. of frog were tolerated in the case of Chloral Hydrate while up to 100 mgr. were tolerated in the case of Chloralamide.

Uses.—Hypnotic in insomnia of alcoholism, neuralgia, hysteria and cardiac diseases. Even 60 grain doses given.—B.M.J. i./09,555.

For insomnia and sea-sickness, Chloralamide and Potassium Bromide of each 15 grains, with Orange Tincture and Chloroform Water recommended. It acts if given as an enema.—*Hale White.*

Elixir Chloralamidi. *Dose.*—1 ounce (**30 Cc.**)=30 grains (**2 Gm.**) Chloralamide 2 Gm., Alcohol 5 Cc., Aromatic Syrup 5·4 Cc., Glycerin 15 Cc., Water *q.s.* to 30 Cc.

Haustus Chloralamidi, G.H.

Chloralamide 30 prains, Musilage of Tragacanth 1 drachm, Chloroform water to 1 ounce.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—3 or more.

Chlorobrom. *Dose.*—$\frac{1}{2}$ to 1 ounce. A specialty said to contain 30 grains each of chloralamide and potassium bromide in an ounce, flavoured with liquorice, for insomnia and sea-sickness.

ⓅCHLOROFORMUM (*Off.*) P.G.V., U.S., P. JAP., P. HELV., FR. CX. $CHCl_3$=119·393.

Ⓟ*Chloroform and all preparations or admixtures containing more than 20% of Chloroform.*

Syn. TRICHLORO METHANE; FORMYL TERCHLORIDE.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), in mucilage and water, or in a perle; 3 drops=1 minim. Small doses may be given as chloroform water or spirit of chloroform. Very large amounts (up to 2 ounces) have been taken internally without causing death.

Historical.

Discovered by Soubeiran 1831, named by Liebig Terchloride of Formyle 1832, re-named Chloroform by Dumas, 1834. Tried as an anæsthetic Nov. 4, 1847, by Simpson, upon himself, who communicated results to the Med. Chir. Soc. Edinburgh, Nov. 10, 1847. *Vide* C.D., Dec. 21, 1912; B.M.J. i./13,41.

The credit is due to Simpson. The claims made on behalf of D. Waldie are not borne out by his own statement.—B.M.J. i./15,1058,1103.

Chloroform is now largely prepared by the action of chlorinated lime on acetone, as well as from both methylated and duty-paid alcohol, *cf.*, also Vol. II.

For testing of Chloroform see Vol. II.

A little caustic lime added to a bottleful will neutralise any acid products that may form in it.

Pink Chloroform and **Green Ether** suggested to prevent accidents. —B.M.J. ii./14,241

Ⓟ**Acetone Chloroform** specially prepared for anæsthesia. Should be kept in amber-coloured, stoppered bottles or in the dark.

Chloroform has Sp. Gr 1·490 to 1·495 @ 15·5° C. Boils at 60°—62° C. Miscible in all proportions with Alcohol, Ether and Oils. It may (*Off.*) be made from Alcohol, Industrial Methylated Spirit or Acetone. Sp. Gr. 1·483 to 1·487, and contains 2% Alcohol added.

Uses.—Inhaled it is anæsthetic and analgesic. Internally is antispasmodic and sedative for asthma, colic, cough, and neuralgia.

In sea-sickness, one or two drops of chloroform on a lump of sugar or in a wineglass of iced soda water, repeated every fifteen minutes often give relief.—Yeo.

Externally in liniments to promote absorption and allay pain, as in neuralgia and sciatica. *See* General Preparations of Chloroform. 1 in 500 is a preservative of Infusions and Animal Extracts. It is a useful deodorant, *e.g.*, for the hands after post-mortem work.

Intestinal parasites, *e.g.*, *Ankylostoma*, *Trichocephalus*, *Ascarides* and *Oxiurides* are well treated by doses *per os* of 3 to 4 Gm. mixed with Castor Oil or Olive Oil. It is a panacea also against all forms of external parasitic infection—*e.g.*, a 20 to 30% Chloroform in a fatty ointment base.—G. Alessandrini, L. ii./15,346.

Anaesthetic Uses and Preparations of Chloroform.

Vernon Harcourt Regulator. (See B.M.J., July 18, 1903). Permits of accurate dosimetry whilst being entirely under control of the anæsthetist. It supplies up to a maximum of 2% admixture of chloroform vapour with the air inspired.

The Chloroform (about 2 ounces) is contained in a conical glass bottle which is connected with one side of a T-shaped metal mixing and delivery tube. The opposite side of the T tube admits the air. Valves in glass chambers on each side show by their opening and closing that inspiration is proceeding properly—in fact the click they produce can be heard by the anæsthetist if his attention is otherwise occupied. The vertical portion of the T forms the delivery tube of the mixed chloroform and air. The regulator which is worked by moving a pointer on a dial is placed at the junction of the two inlet arms of the T with the delivery tube.

To approximate accuracy the temperature of the chloroform has to be between 16 and 18° C. This is arranged for mechanically by a couple of glass beads—both float if the temperature is below 16° C., and both sink if it is above 18° C. The slightest warmth, *e.g.*, of the hand, can be used to adjust.

When the pointer on the dial is at the end of the arc nearest the chloroform bottle the maximum quantity—2% is being given; when at the opposite end only air is passing. The intermediate lines on the dial show 1·8, 1·6, 1·4, 1·2, 1·0, 0·8, 0·6, 0·4 and 0·2%. The valves above mentioned open correspondingly and prevent the entrance into the apparatus of expired air.

In general, the anæsthetist begins with 0·2% and moves the pointer onwards towards the chloroform bottle at the entrance of one division about every half minute—up to 1·6 or 1·8%. To maintain narcosis 1% or less (0·5%) will be sufficient. It will be understood that a fall in temperature of the chloroform is caused by evaporation consequent on inhalation which will produce a smaller delivery of Chloroform. Any shaking, on the other hand, of the bottle would increase the amount. These results can be allowed for at once by moving the pointer.

The neck of the chloroform bottle has in recent patterns of the apparatus a metal collar which enables up to 2·5% chloroform vapour to be given. In some cases this amount may be required.

In use, care must be taken that the face mask fits *closely* to the face. Rolls of moist gauze, wool or lint round the nose may be required.

After prolonged administration and the appearance of slight duskiness a little air or warmed oxygen should be given. This can enter through a tap in the face piece.

Diagrams and further details are given in "Anæsthetics" by Dudley Buxton (H. K. Lewis) on which the above description is based.

Shipway's Apparatus (L. i./16.70). The most satisfactory way of giving chloroform or ether. Warmed mixture of air and anæsthetic vapour in operations for abdominal wounds in war. Patient recovers consciousness quickly and vomiting is rare.—C. Wallace and G. Marshall, L. i./17,640.

Administration of Chloroform either alone or with A.C.E. or Ether on the open Mask.

The following is "a rough sketch" of the usual procedure :—

"The patient who, according to instructions, has been breathing steadily and counting aloud, begins to waver and to make errors in enunciation and then, either with or without a stage of excitement, passes into complete anæsthesia. The pulse slows down, and becomes regular, the respirations become regular and blowing, the flaccid cheeks being puffed out with each respiratory effort ; the whole muscular system becomes limp, and the pupils become moderately contracted and fixed. The chin must be maintained pulled up ; respirations must always be audible, even loud ; pulse must be frequently taken and pupils watched. These are the three indicators.

Pulse.—Pulse greatly accelerated generally means that the patient is coming out and is liable to be sick shortly. If pupils or conjunctival reflex confirm this, push the anæsthetic. Pulse becoming weak, irregular or slower, indicates a state of faintness,–remove mask. If collapse supervenes commence stimulatory measures,—the head to be lowered and body tilted up. Ether and Strychnine hypodermically ; gag to be inserted. See that the pharynx is free from mucus by pulling tongue forward. Rectal injection of Brandy, cold water to face and ears ; hot cloths over pericardium and (to the adult) artificial respiration. In the case of an infant or child the operator doubles a fist into the child's epigastrium to prevent distension of the stomach, covers the child's mouth with a layer or two of gauze, and placing his mouth over the child's, blows the lungs up. The air is then expressed from the lungs and the procedure repeated several times.

Pupils.—When the conjunctival reflex can be elicited, or when the pupils begin to respond to the stimulus of light, more anæsthetic is required. "Pin point" pupils may either mean profound anæsthesia, in which case remove mask, or patient is coming out,—other evidence will indicate what should be done.

When the pupil becomes dilated remove mask, draw both upper eyelids back rapidly and simultaneously. If patient is coming round response will be obtained,—push the anæsthetic. If no response patient is in a state of collapse and requires to be promptly stimulated as described above.

Respiration.—Should the respiration tend to become too quiet failure of respiration should be corrected,—this may be done by closing one of the nostrils with the finger,—this will have the effect of acting as a stimulus to deeper respiration. Keep lower jaw pushed forward and pharynx clear of mucus, also see that tongue is well forward. The loop handle of a sponge holder, using the upper alveolar margin as fulcrum is useful to bring tongue forward in the case of children. Vaseline should be smeared over the parts most likely to come in contact with the mask,—thus preventing burning the patient's skin with the overflowing anæsthetic.—W. Rankin.—Pr. 1911,259.

Behaviour of the blood pressure in Chloroform and Ether anæsthesia with special reference to shock in prolonged operations. Other things being equal Ether produces more severe shock than Chloroform. —Pr. 1911, 265.

Combined Use of Chloroform and Oxygen.—The administration of oxygen with chloroform as an anæsthetic is said to greatly decrease the danger of the anæsthetic. This method is sometimes conducted by passing the oxygen through a wash-bottle containing the anæsthetic. By this means, however, the quantity of the chloroform or ether is relatively small in comparison with the oxygen passed through. Hare suggests for alternative use a funnel-shaped leather inhaler containing a piece of spongiopiline or felt. In the upper surface of the leather inhaler is a small metal tube for connecting with the oxygen supply. By this means a definite quantity of anæsthetic is given and the amount of oxygen can be varied as desired.

Crile's Nasal Tube method of giving Chloroform (with a little oxygen), preceded by Morphine and Atropine.—L. ii./09,364.

If patient be at all dyspnœic, Chloroform is the best anæsthetic. —L. ii./07,139.

Antidotes.

Instructions for treatment if dangerous symptoms arise during inhalation of chloroform, (For Antidotes to ***Chloroform Swallowed*** *see* **Antidotes to Poisons.**) See that the airway is clear and the clothing loose. Place patient upon the floor with legs held up so that the abdomen is at higher level than the brain. Artificial respiration by tongue traction and Sylvester's or Schafer's method.—R.D.H.

Amyl Nitrite to the nostrils and inject hypodermically 1 drachm of ether or brandy* or $\frac{1}{30}$ grain of strychnine. Hot flannels should be placed over the heart.

Inversion of the body has frequently saved patient.

Atropine is useful. The fibrillation of the heart from which death under chloroform frequently arises can be remedied by its subcutaneous use.—'Medical Officer,' May 8, 1915.

A death after anæsthesia from chloroform, nitrous oxide and oxygen.—L. i./99,1095.

Sodium Lactate Solution. Copious rectal injection recommended to restore alkalinity of the blood—assuming acetone and diacetic acid are products of the effects.—M.P.C. i./07,200.

Lavage of Stomach with 2 litres of **warm Sesame Oil** for poisoning, until the washings were free from odour of Chloroform, afterwards Saline Injection. Recovery.—P.J. ii./09,364.

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* Brandy Sterules as also Ether Sterules are handy to carry in the operating bag.

If $\frac{1}{4}$ grain of morphine be first injected hypodermically, less Chloroform is needed, the insensibility is more profound, and the danger attending its use is lessened.

Heart massage in Chloroform Syncope by the subdiaphragmatic route often induces recovery.—B.M.J. ii./09,1471.

Decomposition products are Carbonyl Chloride, Hydrogen Chloride or free Chlorine. These would be noticed before use, and in any case would only produce unpleasant symptoms.—B.M.J. i./12,508.

The SICKNESS produced by Chloroform tends to be more severe when the anæsthesia has been prolonged. Chloroform acts as a depressant, but it also excites the secretion of glands, chiefly the salivary glands. At the beginning of an administration of the drug, especially when the chloroform is being pushed to get the patient under, saliva is being swallowed in large quantities. It is saturated with chloroform. Mucus is secreted copiously. The gastric glands are pouring out a strongly acid secretion. A powerful irritant is thus collecting in a comparatively empty stomach. A gastritis is set up. When the effect of the general anæsthetic is passing off, the lowest functions, such as muscular tone, are the first to reappear. The irritated stomach tries to get rid of its tormentor and vomiting begins. The mucus is tenacious and vomiting is prolonged. The gastritis adds to the severity and painful character of the retching. The stomach contents are often so acid that the patient's lips and cheeks are excoriated by the vomit.

The treatment for such cases is large draughts of Sodium Bicarbonate dissolved in hot water, aided by counter-irritation over the epigastrium This neutralises the acid, dissolves or loosens the tenacious mucus from the stomach walls, and dilutes the irritant in the stomach.

Hot fomentations or light poultices with or without mustard or blisters are efficient counter-irritants for the epigastrium. A dilute hydrocyanic acid, bismuth, and soda mixture acts well, and in some cases with a foul tongue, powders of rhubarb, bismuth and soda are useful to cure gastritis. Such treatment relieves the patient of the distressing heartburn which generally follows severe sickness. Oxalate of cerium is sometimes of use. Morphine increases the sickness, possibly by causing flatulent distension, but is sometimes of use in giving the patient a short rest when suffering severe pain, or when worn out with the constant retching. A combination of scopolamine and morphine, when given as an aid to general anæsthesia, is better. The patient rests well with little sickness the first night after the operation, and there is less trouble with gas distension than with morphia alone.

After most abdominal operations flatulence is relieved by giving salines per rectum—1 pint to 1 quart every four hours—leaving in a rectal tube for an hour or so between times. Rubbing the abdomen adds to the comfort of the patient, more vigorous treatment may be required, such as turpentine enemata. If the violent sickness still persists on the second day, castor oil or magnesium sulphate should be given by the mouth. Although these drugs are more often rejected, a certain quantity stays down and will do good. If the bowels do not act in six hours an enema of soap and water will prove effectual. Peristalsis returns and gas does not accumulate. The patient's strength, which is failing under the stress of the constant sickness, can be sustained by rectal enemata of brandy and water and sips of brandy by the mouth.

In abdominal operations when the vomit is hæmorrhagic and resembles beef-tea dregs or coffee grounds, carry out the above treatment for flatulence, stimulate the patient, give copious draughts of hot soda solution. From whatever cause, there is a leak of blood into the stomach, this must also tend to increase sickness already present. By washing out the stomach with a rubber tube and funnel we get rid of that blood which has already collected, but it goes on collecting. Follow this with 5 to 10 minims of adrenalin solution or 5 to 30 minims of Suprarenal Extract in a little water. The vomit will no longer be hæmorrhagic, and the sickness soon disappears. A number of cases healed in this way with good results. In animals poisoned with chloral or chloroform until the pulse has almost ceased, the circulation may be restored immediately by this treatment. Suprarenal thus used probably stimulates the muscles of the stomach walls, blanches the dilated capillaries, and sets up regular rhythmical contractions of the stomach, which cause its contents to follow their natural course and to flow on into the duodenum.—J. W. Keay, Pr., Nov. 1910, p. 706.

Small doses of chloroform on a lump of sugar sucked when desire to vomit comes on give brilliant results. The idea was hit upon by analogy with the fact that confirmed "Spreeërs" get best result for alcoholic vomiting with small doses of alcohol.—B.M.J. ii./10,230.

Death-rate with chloroform is about 7 times as great as that with ether (1 in 13,500).

Recovery under strychnine after drinking two ounces.—B.M.J. ii./97,1498.
Two deaths, one with chloroform alone, the other with A.C.E. (3½ ounces) and ethyl chloride (5 Cc.)—B.M.J. i./07,617. *See also* L. ii./06,1232; L. ii./08,799. Three cases of delayed poisoning with.—L. ii./09,81.
Alleged action of chloroform on the heart. It may be safely given in any operation, providing the patient is suitable.—B.M.J. i./07,1030.

Swallowing Chloroform—error with Junker apparatus. No harm resulted.—R. W. Lloyd, L. ii./17,98.

B.M.A. DISCUSSION ON DOSIMETRIC ADMINISTRATION OF CHLOROFORM.—2% of Chloroform under normal conditions has not in the opinion of the Committee appointed by the B.M.A., led to dangerous consequences. Waller says for successful administration must be supplied continually in 1 or 2% strength. If for a few moments the administration is discontinued the patient being slightly under, would show signs of coming round.—B.M.J. ii./10,751, 754, 784, 797.

Shock should be treated by rectal injection of Suprarenal Extract *q.v.*), in preference to strychnine, brandy, &c.—Blumfield, Pr. Feb. /09,242.

Glucose is useful in delayed poisoning following chloroform inhalation. In one case—a boy who had taken chloroform upon a previous occasion without detriment—recovered under a mixed treatment of alkalies and glucose, *vide* Glucose.

Chloroform and Ether.—Respective values of the Methylated Spirit and Rectified Spirit products. Opinions of the leading anæsthetists about equally divided.—Sir F. Hewitt and H. Robinson hold there is no difference.—L. ii./12,1233.

Adrenalin in Chloroform Anæsthesia.—Death following injection of 5 minims of Solution (1 in 1000) with light Chloroform anæsthesia in an operation for deflected nasal septum. When Chloroform anæsthesia is deep the danger of injecting Adrenalin is less than when light.—B.M.J.i./13,879. It should not be given to a patient under Chloroform.—*Ibid*, p. 704. Death probably caused by Adrenalin getting into the blood stream.—B.M.J.i./13,1028. General anæsthetic not necessary.—*Ibid*, p. 1350.

Death under Chloroform given by a nurse.—B.M.J. ii./13,829.

Increased risk of fatal acidosis after Chloroform in presence of abdominal sepsis.—R. Apperly, B.M.J. ii./12,624.

Tracheal administration of anæsthetics (Chloroform) by means of an orotracheal catheter prevents the admission of blood to the air passages.—Wm. Hill, B.M.J. ii./13,745.

Ⓟ **A.C.E.** (Alcohol, Chloroform and Ether).

Absolute Alcohol, Sp. Gr. 0·795, 1; Chloroform, Sp. Gr. 1·495, 2; Purified Ether, Sp. Gr. 0·720, 3; Sp. Gr. about 1·002. The three ingredients are intended to evaporate uniformly.

A.C.E. is as effective as pure Chloroform, and a safer agent when deep and prolonged anæsthesia is to be produced, while at the same time it is sufficiently rapid in its operation to be convenient for general use, although it takes a longer time than Chloroform (10 to 15 minutes) to procure anæsthesia. It is of service in midwifery.

Ⓟ **C.E.**, *i.e.*, a mixture of chloroform 2 parts with ether 3 parts, is an even better anæsthetic mixture in some cases, *e.g.*, where the airway is encroached upon as in angina Ludovici, in thyroid enlargement, in sublingual abscess, etc.—L. ii./07,139.

This mixture in same proportions using a Skinner's mask employed in a variety of grave operations—panhysterectomies, removal of double pyosalpinx, difficult appendicectomies, excisions of rectum, &c. Time of induction of anæsthesia averaged about 8 minutes. The mixture is recommended.—L. ii./09,11,

In general cases C.E. is best. L. ii./07,140. Death under—due to vomiting.—L. i/11,1350.

As anæsthetic "C_1E_2." In adenoids and enlarged tonsils this is best.—B.M.J. i./09,1354.

The addition of a small amount of Chloroform to Ether, *e.g*: the proportion $E_{12}C_1$ (by volume) distinctly saves the work of the lungs and heart, a factor of importance in a long operation. Irritation caused by ether given by the "closed" method is reduced. Safe and rapid, useful for soldiers. A few drops of E_2C_1 preferable to ethyl chloride as preliminary to giving ether or $E_{12}C_1$.—W. J. McCardie, B.M.J. i./17,508.

Ⓟ **Vienna Mixture** is Chloroform 1, Ether 3.

Inhaler, simple and inexpensive for administering A.C.E. and C.E.—will not get out of order.—B.M J. i./05,24. L. ii./05,296,297

Choice of an anæsthetic.—Dudley Buxton advocates 1 in 10 Alcohol and Chloroform by the open method in preference to A.C.E. or C.E , while the anæsthesia is to be maintained in medium aged children right through the operation.—P.R S.M. Anæsth. Sectn., Apl. 1910, p. 65.

General Preparations of Chloroform.

Aqua Chloroformi (*Off.*) and P. Jap.—1 in 400 of water.

Dose.—½ to 2 ounces (**15 to 60 Cc.**).

Salts, like sodium sulphate, are apt to cause deposition of chloroform from aqueous solution.

Ⓟ**Chloroform Sterules** *for Inhalation.—Martindale.*

Encased in cotton wool and silk ; contain 10 minims in each. Are convenient for use in asthma, &c. ; may be fractured and used by the patient while in bed. In angina pectoris Chloroform inhalations —" so far from being unsafe in cardiac disease, are often of the greatest use and perfectly safe."—Whitla. Yeo.

Sterules are also made containing 20, 30, and 60 minims—the last for obstetric purposes avoiding risk of overdose.

A slight inhalation of chloroform combined with amyl nitrite useful in vagal and vaso-vagal attacks.—L. i./07,1554.

Recent research has shown that in some cases of angina pectoris, the blood pressure is too low, instead of being increased as is commonly supposed ; in such cases chloroform inhalation may be dangerous.—B.M.J. ii./13,319.

Maniacal delirium treated by Chloroform inhalation combined with morphine hypodermically.—L. i./93,861.

In phthisis inhalation with a little eucalyptus oil, palliative ; the chloroform acts as a bactericide.—B.M.J. i./06,198.

In croup brief inhalation of Chloroform acts promptly.—Whitla, Pract. Med.

Ⓟ**Gelatin Capsules of Chloroform.** *Dose.*—One or two.

Contain each 5 minims ; are for similar uses, but the chloroform is apt to volatilise ; Perles containing 3 **minims.** Very useful in sea-sickness.

Ⓟ**Chloroform and Ethyl Iodide Sterules,** *v.* Ethyl Iodide.

Ⓟ **Chloroformum Camphoratum, B.P.C.**

Camphor 2, Chloroform 1.

Useful for toothache, applied on cotton wool.

Ⓟ **Chloroformum Mastiche.**

Mastiche 1, Chloroform *q.s.* to 2.

Ⓟ **Guttæ Chloroformi cum Menthol Compositæ.**—Self-Inflator Drops. Menthol 20 grains, Chloroform ½ ounce, Acetic Ether and Alcohol 90% of each 2 drachms.—*Dundas Grant.*

Directions.—5 drops to be placed upon the wool in the inflator on each occasion of use.

In cases of chronic tympanic and Eustachian catarrh ; value depends to some extent upon the ease with which air containing a little chloroform vapour passes up the Eustachian tubes. Inflation with an **Eustachian Self-Inflator** is to be conducted as follows :— Drop the amount prescribed on to the wool in the mouth-piece of the inflator by means of a medicine dropper. With the glass mouthpiece held firmly between or against the lips (according to the form of the instrument) and the nosepiece tightly in the freer of the two nostrils, compress the other nostril to close it completely. Draw a breath (not through the instrument) and then blow through it so as to puff out the cheeks and 'crack the ears.' If vapour is too irritating blow through the instrument a few times before use. To concentrate the effect on the right ear close firmly with the finger the *left* ear and bend the head sideways over the left shoulder—*vice versa* for the left ear.—C.L.T.E.

The duration of treatment should be controlled by the prescriber.

Ⓟ **Linimentum Chloroformi** (*Off.*).
Chloroform 1, Liniment of Camphor 1.

Vaseline might with advantage replace the oil of the camphor liniment for this preparation. U.S. orders Chloroform 3, Soap Liniment 7.

P1 Liquor Chloromorphiæ, Chloromorphia Solution. (*Miscible.*)
Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Chloroform 150, Glycerin 400, Liquid Extract of Liquorice 100, Morphine Hydrochloride 10, Solution of Atropine Sulphate 20, Oil of Peppermint 2, Alcohol (90%) *q.s.* to 1000.

10 minim dose contains:—Chloroform $1\frac{1}{2}$ minims, Morphine Hydrochloride $\frac{1}{11}$ grain, Solution of Atropine Sulphate $\frac{1}{5}$ minim.

Dissolve the Morphine Hydrochloride in the Liquid Extract of Liquorice, Glycerin and Atropine Solution previously mixed: in part of the Alcohol dissolve the Chloroform and Oil of Peppermint; mix with the morphine solution, and add Alcohol *q.s.* to 1,000.

A useful sedative, resembling the remedy Ⓟ **Chlorodyne,** in active constituents; but see also Proprietary Medicines chapter. **P1 Capsules** (gelatin) containing 5 minims for use of travellers are convenient.

P1 Tinctura Chloroformi et Morphinæ Composita (*Off.*).
Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Chloroform 75, Morphine Hydrochloride 10, Diluted Hydrocyanic Acid 50, Tincture of Capsicum 25, Tincture of Indian Hemp 100, Oil of Peppermint 2, Glycerin 250, Alcohol (90%) *q.s.* to 1000.

10 minim dose contains:—Chloroform $\frac{3}{4}$ minim, Morphine Hydrochloride $\frac{1}{11}$ grain, Dilute Hydrocyanic Acid $\frac{1}{2}$ minim, Tincture of Capsicum $\frac{1}{4}$ minim, Tincture of Indian Hemp 1 minim.

Mix. Contains approximately four times the proportion of morphine present in the preparation of B.P. 1885.

N.B.—Contains Hydrocyanic Acid which the Chloromorphia Solution does not.

Poisoning by 4 ounces of Chlorodyne, with recovery by use of atropine, strychnine, and stimulants.—L. ii./90,670, *vide* also L. ii./96,1456; i./98,1686.

Spiritus Chloroformi (*Off.*).—*Syn.* CHLORIC ETHER. 1 in 20 of alcohol (90%). U.S. has 3 in 50.

Dose.—30 to 40 minims (**2 to 2·5 Cc.**), or 5 to 20 minims (**0·3 to 1·2 Cc.**) repeated.

Tinctura Chloroformi Composita. B.P. 1885. Chloroform 2, Alcohol 90% 8, Compound Tincture of Cardamoms 10.
Dose.—5 to 60 minims.

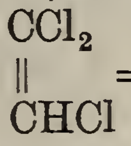
Dichlorethylene. *Syn.* ACETYLENE-DICHLORIDE $C_2H_2Cl_2$ = 96,946.

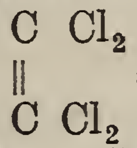
Is employed as a solvent of Iodine for sterilising the skin, 2·5% w/v is employed, *i.e.*, practically a saturated solution. It is a mobile liquid with Sp. Gr. 1·25 and B. pt. 55° C. This solution is said to cause the operating surgeon or assistants no lachrymation or catarrh of the nasal mucous membrane which the Iodine Tincture produces.

N.B.—The name **Dichloride of Ethylene** has been applied to this substance, *v.* B.M.J. i./10,1288. It has the composition $C_2H_4Cl_2$ = 98·962. B. Pt. 85° C. and Sp. Gr. 1·255 at 15° C., but it should be particularly noted that Dichlorethylene is **required** for the purpose.—P.J. ii./11,623.

Iodine in skin asepsis—comparative results with Dichlorethylene.—J. W. Peck, P.J., i./12,450.

✱WESTROPOL (T.M. **350667** and 352362, Class 2). A soap solution containing 25% Trichlorethylene and WESTORAN—a soap solution containing 95% Tetrachlorethane $C_2H_2Cl_4$ = 167·866 were found efficient as vermicides. For cleaning the body bathing or sponging with soap solutions containing 2% trichlorethylene or 10% tetrachlorethane give good results. Further, a 25% solution of Trichlorethylene in vaseline would be an efficient insect pomade. Dichlorethylene also useful.—J. P. Kinloch, B.M.J. i./15,1038. It is used for washing clothes and removing grease in laundries. The name WESTRON is given as indicating Tetrachlorethane (without the soap).—P.J. ii./16,384; i./20,243.

Trichlorethylene. 
$\begin{matrix}CCl_2\\ \|\\ CHCl\end{matrix}$ = 131·398 Sp. Gr. 1·47, B.pt. 88°C.—difficult to volatilise though a good solvent, especially for fats.

Tetrachlorethylene, C_2Cl_4 or 
$\begin{matrix}C\ Cl_2\\ \|\\ C\ Cl_2\end{matrix}$ = 165·85. *Syn.* **Perchlor-Ethylene. Carbon Dichloride** (CCl_2). Heavy liquid (Sp. Gr. 1·619), B.pt. 110° to 120°, solvent of fats, resins, rubber and alkaloids. Originally investigated by Faraday. Difficult to volatilise. Gives a heavy vapour which caused death in aircraft works when used in a cellulose varnish.—C.D. ii./14,845. (*c.f* Carbon Tetrachloride which is similar and has also produced death.)

All these bodies are non-inflammable and non-combustible.

CHRYSAROBINUM (*Off.*) U.S., P. Jap.

$C_{30}H_{26}O_7$ = 498·358. *Syn.* Commonly but erroneously called CHRYSOPHANIC ACID.

Dose.—$\frac{1}{6}$ to $\frac{1}{2}$ grain (**0·01 to 0·03 Gm.**) or more.

This substance was erroneously stated to contain 80 to 84% of Chrysophanic Acid, but it was subsequently shown that the Acid was developed from the Goa Powder (*q.v.*) by the Alcoholic Solution of Potash used in extraction.—B.M.J. ii./10,1593. It consists chiefly of Chrysarobin, with varying amounts of Chrysophanic Acid. *For further details see Vol. II.* It is obtained from Araroba (*q.v.*) by extraction with hot chloroform

C.R. 1908 advised the name **'Araroba Purificata'** to replace Chrysarobinum.

A tasteless inodorous crystalline yellow powder. It is contained in rhubarb (mainly as Chrysophanic acid) and dock root. Ash limit 1%.

Solubility.—In water only slightly; in ether 16, chloroform 12·5 (at 25° C., U.S.). We found recently (1914) 1 in 12 in Chloroform, 1 in 18 Benzol. 'Not readily' in hot alcohol (Dott). Partly and sparingly in petroleum spirit.

Uses.—Externally as ointment or pigment. Chrysarobin is a powerful stimulant and parasiticide in acne rosacea, psoriasis, lupus, ringworm of the scalp, pityriasis and tinea circinata.

In alopecia success after other remedies failed.—B.M.J. i./07,491.

Psoriasis in the army treated by Chrysarobin and Salicylic ointments or in Lassar's Paste.—H. W. Barber, B.M.J. i./18,369.

Unguentum Chrysarobini (*Off.*).

This is now prepared same strength as B.P. '98, but with soft paraffin. U.S. has 3 in 50 of Benzoated Lard.

It stains the skin and hair, and a strong ointment after three days' continued use sometimes produces feverishness and irritation. 5 to 10 grains to an ounce may be better. Its stains can be removed by benzol, weak solution of potash or chlorinated lime.

Unguentum Chrysarobini Compositum (Unna) and St. J. H. Chrysarobin 5, Salicylic Acid 2, Ichthyol 5, Vaseline 88.

Psoriasis is treated by an ointment of Chrysarobin 5, Salicylic Acid 2½, Birch Tar (Oleum Rusci) 5, Soft Soap 6½, Vaseline 6½ (Unna).

Baculum Chrysarobini.

Chrysarobin 30 grains, Wax 20 grains, Lanolin 50 grains.

Ⓟ**Pigmentum Chrysarobini.**—*Adopted by G. H.*

Chrysarobin 1; Gutta Percha Solution (B.P. 1885), 9.

In psoriasis, painted on twice a day with a brush for ten days without washing—finally washing off.—L. i./09,968.

Ⓟ**Traumaticin** (*Martindale*), adopted by **P. Belg.**, composed of Gutta Percha (purified) 1, Chloroform (by weight) 9, is also used for making the above pigment. More cleanly than liniments or ointments. Can be prepared stronger in gutta percha if desired.

Pigmentum Chrysarobini et Pyrogallol.

Chrysarobin 1, Pyrogallol 1, Ether and Alcohol, of each 10, Collodion 120. Apply after bathing every third day for psoriasis and ringworm. Chrysarobin may also be applied with Camphoid, *q.v.*

Ⓟ**Suppositorium Chrysarobini.**

Chrysarobin 1¼ grains, Iodoform $\frac{3}{10}$ grain, Belladonna Extract $\frac{1}{7}$ grain, Glycerin *q.s.* to make a suitable paste and Cacao Butter *q.s.* to 30 grains. Found to give extraordinary results in hæmorrhoids.—U.S.D.

Araroba. *Syn.*, **Goa Powder** (*Off.*). **Crude Chrysarobin. Araroba Depurata, P. Austr.**=Chrysarobinum.

A brownish concretion from the cavities in the trunk of *Andira araroba* (*Leguminosæ*), dried and powdered.

Crude Araroba is imported from Brazil; not less than 50% of its weight is chrysarobin, or chrysophanic acid so-called. The Indian mode of using the drug was to cut a lime fruit, dip it in the powder and dab it on the affected skin. The Brazilians mix it with vinegar.

Eurobin. Chrysarobin-tri-Acetate. A brownish powder recommended as a substitute for chrysarobin. Solutions of 2 to 3% are said to be effective and free from toxic effects, non-irritant, and do not stain. **Lenirobin** is **Chrysarobin-tetra-acetate.**

CINCHONÆ CORTEX.

(*Rubiaceæ*).

The principal dried barks used for the production of the salts of the Cinchona alkaloids are:—Red Cinchona bark, from *Cinchona succirubra*; Yellow Cinchona bark, obtained from *Cinchona Calisaya* containing upwards of 6% of alkaloids (half of which is quinine); pale Cinchona bark (crown or Loxa bark), from *Cinchona officinalis* (containing 5% alkaloids of which 3½% may be quinine); the bark of *Cinchona lancifolia*, Mutis; Columbian bark (containing about 2% alkaloids, of which only small proportion is quinine); and other species of Cinchona; that of certain species of Remijia may also be used. The variety most used for making galenical preparations is the cultivated Red Cinchona.

Cinchona, U.S., is from various species. 5% total alkaloids. *C. rubra* is separately official.

C. CALISAYA, Quinquina Jaune, is official in FR. CX. for making Extract. 1000 Gm. of good Calisaya Bark should yield 30 Gm. of Quinine Sulphate (+$8H_2O$)=25 Gm. approx. of anhydrous Quinine Sulphate=22 Gm. approx. of anhydrous Quinine.

C. SUCCIRUBRA, FR. CX. Quinquina Rouge is to contain at least 50 Gm. total alkaloid=15 Gm. Quinine Sulphate (+$8H_2O$)=12½ Gm. approx. anhydrous salt dried at 100° C.=10·9 Gm. approx. of Quinine base anhydrous—per 1000 Gm. of bark.

The Quinine barks, as they are called, now imported from South America, are chiefly the Calisaya in quills; those known as Cuprea barks, the produce of species of Remijia, are more expensive. A larger quantity of cultivated bark, the produce of *C. succirubra*, *C. officinalis*, and hybrids, arrives from Madras and other parts of India, most of the rich Java bark, produced by *C. Calisaya, var. Ledgeriana*; has hitherto been shipped to Amsterdam. The old natural "flat" Calisaya bark is not now met with, but a kind of yellow bark, pressed into flat pieces, is imported from Bolivia to replace it. The flatness is produced by tight packing in serons bound with green hide thongs which, contracting, keep it flat.

For further details on cultivation, etc., see Vol. II

Cinchonæ Rubræ Cortex, Red Cinchona Bark (*Off.*). *Dose.*—5 to 60 grains (**0·3 to 4 Gm**). P. HELV. has minimum 6·5% alkaloids. FR. CX. has 5% *vide antea*.

The dried bark of the stem and branches of cultivated plants of *Cinchona succirubra*. Tested by official process, it should yield between 5 and 6% of total alkaloids, of which not less than one-half should consist of quinine and cinchonidine.

Flavorings—as for Quinine *q.v.*

Decoctum Cinchonæ. B.P. 1885.—1 produced 16. *Dose.*—1 to 2 ounces (**30 to 60 Cc.**).

Elixir Cinchonæ. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Liquid Extract of Cinchona 1, Simple Elixir 7. Mix.

Extractum Chinæ.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).

Fr. Cx.—Aqueous extract containing not less than 6% alkaloids.

Extractum Cinchonæ Liquidum (*Off.*)

Dose.—5 to 15 minims (**0·3 to 1 Cc.**)

This contains 5% of total alkaloids, and is an acid preparation; 1=about 1 of bark.

If prescribed with Acid, as in the following:—Spirit of Chloroform 1½ drachms, Nitro-hydrochloric Acid 1½ drachms, Liquid Extract of Cinchona 1½ drachms, Water to 6 ounces, mix the first three in order written, and pour into the water to produce best result.

Liquid extract of red bark has been much lauded in America for giving drunkards a distaste for alcohol.

Only about 20% of the total alkaloids in Cinchona can be extracted by Dilute Hydrochloric Acid as in making this liquid extract Glycerin does not exert a solvent action on the alkaloids: best to add it at end of the process. The B.P. 1898 Assay process is best.—O. Chick, P.J. ii./17, 144; C.D. ii./17, 612.

For Notes on Assay, see Vol. II.

Fluidextractum Cinchonæ, U.S. *Average dose.*—15 minims. Standardised to not less than 4% nor more than 5% alkaloids, *w/v.*

Tinctura Cinchonæ (*Off.*).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

About 1 in 5 of 70% alcohol; standardised to about 1% of alkaloids. **U.S.** not less than 0·8 or more than 1% of alkaloids.

Maceration for 24 hours with ½ ounce hide powder to the pint is said to detannate the tincture.

Mistura Antidipsomania. N.H.W.

Tincture of Cinchona 1 drachm, Glycerin ½ drachm, Tincture of Capsicum 3 minims, Decoction of Cinchona to ½ ounce.

Tinctura Cinchonæ Composita (*Off.*).

Syn. Huxham's Tincture of Bark. About 1 in 10 of 70% alcohol. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**). The Saffron is now omitted. **U.S.** is similar.

Vin de Quinquina Officinal (Fr. Cx.)

Macerate Cinchona 25 with Dilute Hydrochloric Acid 2, Alcohol 60% 75, for 24 hours shaking occasionally. Add Red Wine 920, macerate 24 hours and filter.

Dose.—½ to 5 ounces (**15 to 150 Cc.**). Less for children.

Vinum Chinæ. P. Jap. 1907. Dose 1 to 4 drachms. Dissolve White Gelatin 1, by warming in Distilled Water 10, and add Sherry 1,000, Cinchona Bark in coarse powder 40, extract in the cold for eight days; press, in the expressed liquid dissolve Sugar 100, Tincture of Bitter Orange Peel 2, set aside in a cool place for 14 days and filter.

CINNAMOMI CORTEX *(Off.)*.

The dried bark from *C. zeylanicum* (*Lauraceæ*).

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Aromatic, carminative and antiseptic, employed as flavouring agent. Contains volatile oil and tannin. Official are Compound Powder (1 in 3), Water (1 in 10), Spirit (also U.S.—1 of oil in 10), and

Tinctura Cinnamomi. (*Off.*). *Dose.*—½ to 1 drachm.

1 in 5 alcohol 70%. Might be made with 60% alcohol.—P.J. ii./09,142.

Tinctura Cinnamomi Composita P.L.

Dose.—20 to 40 minims (**1·2 to 2·4 Cc.**).

Cinnamon Bark 16, Cardamom Seeds 8, Long Pepper 5, Ginger 5, Alcohol 60% 640. Macerate seven days.

Oleum Cinnamomi (*Off.*). *Syn.*, OLEUM CASSIÆ. **U.S.**

Dose.—½ to 3 minims (**0·03 to 0·2 Cc.**).

Contains 55 to 65% Cinnamic Aldehyde (*v.*p. 29) by volume. **U.S.** requires 80%.

For Analytical Data, see Vol. II

The light yellow oil distilled from the bark. The Chinese oil, as distinguished from that made in Ceylon, is known as Cassia Oil.

'Leaf Oil' is practically free from Cinnamic Aldehyde.—P.J. ii./08,62.

Soluble in alcohol 90% about 10 in 3.

Is occasionally prescribed as an inhalation (30 to 40 minims) with boiling water 1 pint. Cinnamon oil is used in influenza and catarrhs.

Stimulates the heart reflexly and directly dilates blood vessels, thus exerting valuable action on vaso-motor system. Action on bronchial tubes anti-spasmodic. Should be given in 20 minim doses in milk (or on sugar) for first three hours, every other hour 15 minims for two doses, then three or four hourly 10 minim doses. If patient can take to bed cure will be rapid.—L. ii./08,1661. (*See also* Oleum Eucalypti). Cinnamon oil relieves toothache.

Warts treated by Cinnamon Oil applied locally.—Pres. Nov. 1912,276.

In chronic deep seated sepsis such as internal venous thrombosis with pyrexia and other constitutional symptoms more general use of Essential Oils advocated. It is a good plan to vary the Oil, *e.g.*, 10 minims four times daily in capsules of Cinnamon one day, Cloves the next, Peppermint, and so on The antiseptics in this way saturate the system. Not on empty stomach.—H. French, Woolwich Medical Association.

Children exposed to infection by German Measles have been prevented from taking the disease by powdered Cinnamon—as much as will lie on a sixpence or shilling with their food night and morning. Should be tried in measles also as a prophylactic. Essence of Cinnamon in 25 drop dose one of the most effective remedies in cases of acute coryza.—W. B. Drummond. B.M.J. i./17,765; ii./17.32.

Warts cured by application of the oil. Sir W. Cheyne found it effectual.—L. ii./15 672.

Aqua Cinnamomi Concentrata *v.* **Aquæ Concentratæ.**

Capsules of Cinnamon Oil. 2½ minims increased to 5 minims with **Quinine Sulphate** 1 grain in typhoid.—B.M.J. ii./04,1450.

Cinnamon Dental Paste. Iodoform made into a paste with Cinnamon Oil.

COAL TAR DERIVATIVES.

The Aromatic series of derivatives from coal tar, so freely used as antipyretics and analgesics, produce changes in the blood, diminishing its respiratory capacity and destroying red corpuscles.—L. i./93,377.

***Liquor Carbonis Detergens.** (*Wright's*). (T.M. 7418 & 7419 Class 2, 47 & 48).

This alcoholic preparation owes its properties in part to Phenol. Is used as a Lotion, from 1 drachm to 1 ounce to a pint of distilled water forms a yellowish milky emulsion; or, as an Ointment, Liquor Carbonis Detergens 1, Unguentum Hydrargyri Nitratis 3, Unguentum Simplex 4. In prurigo and chronic scaly skin diseases.

The following is also useful in eczema: Liquor Carbonis Detergens 2, Liquor Plumbi Subacetatis 2, Zinci Oxidum 4, Glycerinum 4, Aqua 36. *Vide also* **Wright's Coal Tar Soap.**

A ***Coal Tar Inhaler and Vaporiser** is made for treatment of whooping-cough, croup, bronchitis, influenza and like affections.

Balneum Picis Carbonis. St. John's H. Balneum Bituminis, L. H. Solution of Coal Tar 8 ounces, Water at 95° F. 30 gallons.

St. M.'s H. had Tar 3, Methylated Spirit 2, Ether 1. This lotion to be applied and allowed to dry, then followed with hot bath.

Lotio Plumbi Detergens, V.H.C.

Liquor Carbonis Detergens 1, Liquor Plumbi Subacetatis Fortior 2½. One teaspoonful to a pint of water.

Unguentum Picis et Acidi Salicylici, V.H.C.

Liquor Carbonis Detergens 30 minims, Salicylic Acid 15 grains Ammoniated Mercury 5 grains, Soft Paraffin to 1 ounce.

Pruritus ani well treated by tar preparations.—B.M.J. ii./09,321.

In psoriasis 1 in 8 of lanolin to be rubbed in.—L. i./09,968.

Lotio Picis Carbonis Alkalina. St. Th. H.—Liquor Picis Carbonis 1 drachm, Sodium Bicarbonate 120 grains, Water to 1 pint.

Lotio Picis Carbonis Aromatica.

Prepared Coal Tar 3 ounces, Ether 2 ounces, Methylated Spirit 1 ounce. Dissolve, filter and add Peruvian Balsam 6 drachms, Salicylic Acid 1½ drachms.

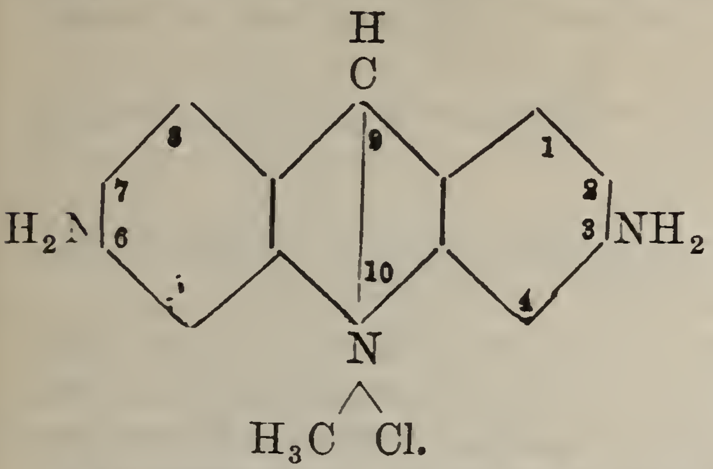
Liquor Picis Ligni may be prepared by dissolving Wood Tar 1 in 20 of a Tincture of Quillaia 1 in 10 of Alcohol 90%.

One part to 7 or more is useful for skin affections. The tincture of quillaia enables Tar solutions to form emulsions with water.

Aqua Picis, Ph. Ned., 5% by mixing with Pumice.

Alopecia areata treated by this preparation and occasional application of **Burt's Fluid** (a special preparation). Hair grew completely —P. S. Abraham, P.R.S.M. Derm. Sectn. Mar., 1910, p. 55.

Acriflavine. *Syn.* **Diamino-Methyl-Acridine Chloride.** (The compound originally called **Trypaflavine** in Germany was initially called Flavine here, but the latter name was abandoned, as it is applied to a vegetable dye.—B.M.J. i./17,769. The substance is the subject of Casella's British Patent No. 24652 of 1910 (D.R.P. 243085) and is made under licence by firms in this country. The name Acriflavine was agreed to by the Board of Trade on the understanding that licensees of the patent should manufacture the compound under that name only).



or $C_{14}H_{14}N_3Cl = 259·672$,

✱Trypaflavine. TRADE MARK (No. 327437, Class 1), Suspended under Temporary Rules Act. Permit has been granted to two British firms to use.

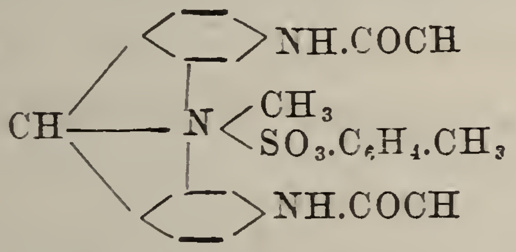
Manufacture.—Details of the process are given by Benda (Ber. 45, p, 1787, *et seq.*) and in the patent specification. A survey of Benda's paper and the patent specification with some amplifications from Prof. G. T. Morgan, gives the following information :—

Aniline and Formaldehyde are combined to form anhydro-formaldehyde Aniline —polymeric form $[C_6H_5N : CH_2]_3$. This base is condensed with Aniline and Aniline Hydrochloride to pp^1—Diaminodiphenyl-Methane.

This DIAMINODIPHENYL-METHANE is dissolved in Sulphuric Acid and nitrated at not exceeding 5° C. and neutralised with Soda. The paste of the Dinitro-Diamino body is reduced with Tin and Hydrochloric Acid.

The TETRA-AMINODIPHENYL COMPOUND formed is heated as its tin double salt with HCl 4 hours at 135° C.

Ammonia is eliminated and a mixture of dihydrodiamino - Acridine and its oxidation product diamino Acridine is produced, both bases being as hydrochlorides (the Sulphate of the latter base is Proflavine). The oxidation is due to the presence of air in the Autoclave. It is completed with the aid of Ferric Chloride. The diamino acridine is now acetylated to the di-Acetyl derivative. This body, dissolved in a dry inert solvent is methylated in the acridine ring with either dimethyl Sulphate or methyl toluene-*p*-Sulphonate. The diacetyl product



(or $SO_4.CH_3$)

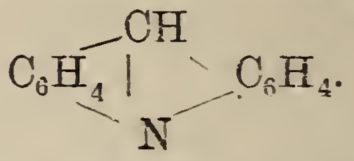
crystallises and is then hydrolised by boiling with Hydrochloric Acid when the Acetyl and the Sulphate or Sulphonate groups are removed and Acriflavine is obtained of the formula indicated.—*c.f.* also details under Proflavine.

In the patent specification it is stated that, compared with its higher homologues, such as Acridine Yellow (which is 3 : 6 — diamino — 2 : 7 dimethyl - acridine Hydrochloride) this body has the advantage of being very soluble, and these hitherto " unknown salts of 3 : 6 Diamino — 10 alkyl or aralkyl Acridine have proved specifics against trypanosomes."

It might be made by a method other than that of the patent.—See C.D., July 14/17, page 609.

Properties.—The compound is in the form of a reddish brown crystalline powder.

The trypanocidal property depends greatly, Browning says, on the presence of the methyl group attached to the Nitrogen atom—this is implied, though not expressly stated, in Benda's work.

It may be added that the Acridine series of dyes have as initial member **Acridine**  $C_6H_4\left\langle\begin{matrix}CH\\ |\\ N\end{matrix}\right\rangle C_6H_4$. They are formed by heating Diphenylamine with fatty acids in presence of Zinc Chloride, *e.g.* $(C_6H_5)_2NH + H.COOH = (C_6H_4)_2N{-}CH + 2H_2O$.—

Solubility.—In water 1 in 5. Commercial samples we find vary considerably. In alcohol 1 in 40. In glycerin 1 in 4 or less. Insoluble in liquid paraffin, oleic acid, vaseline and eucalyptol—by experiment.—W. H. M., 1917. Concentrated aqueous solutions are brown, dilute ones lemon yellow with green fluorescence.

Compatible with 5% (and under) Sodium Chloride solution, also with 0.5% Sodium Citrate.

Incompatible with Dakin's Solution, Eusol and other Chlorine Antiseptics. Also with Mercuric Chloride Solution (*e.g.* 1 in 1,000 as used), also with Phenol (*e.g.*, 1 in 20 solution)—by our experiments.

Solutions may be boiled or heated in an autoclave to 130° C.

To remove Acriflavine stains from the hands, etc.—Rub with a little dilute Hydrochloric Acid or with a little dilute Sulphurous Acid, or with Sulphurous Acid followed by Hydrochloric Acid, and then wash with water. Either of these procedures is effectual.

Internal use.—The substance has not been advised for internal use, but we are indebted to a correspondent (Dr. A. Houlgrave) for the following notes:—"I took two or three 1/8 grain doses of Acriflavine and noticed nothing definite, then I took three ¼ grain doses evening, morning and evening. The only effects noticed were that I perspired heavily on the night of the third dose.

Antiseptic Powers.—It possesses marked antiseptic and in particular trypanocidal powers, hence the name Trypaflavine.

It is specially active ***in presence of serum.*** According to C. H. Browning and his co-workers, the ideal antiseptic must have a great potency in the presence of serum; it must stimulate granulating processes; it should not interfere with phagocytosis, and must not be irritating to the tissues. Bactericidal activity of many hitherto employed antiseptics is diminished when the media containing the bacteria are composed entirely or partly of serum. Acriflavine was found, amongst the series of bodies examined, to be the only one of high antiseptic power to maintain its action in presence of serum. The potency of Acriflavine, it is stated, is not merely unimpaired by blood proteins—it is enhanced by their presence.

The members of the group of Diamino-Acridine derivatives in the presence of serum are the most potent bacterial agents known and the property of being enhanced in this activity by serum is shared by no other type of chemical compound that has been investigated.

The closely allied substance Diamino-Acridine Sulphate (**Proflavine**) has similar properties, though it is not so active in curative properties in experimental trypanosome infections.

Intravenous injections into rabbits showed that this Acridine Sulphate compound will render the blood serum antiseptic or greatly augment its bactericidal power—this is still manifested several hours after injection.—C. H. Browning and R. Gulbransen. Proc. Roy. Soc., B. Vol. 90, 1917, p. 140.

The list of bodies investigated includes Phenol, Iodine, Hypochlorites, Malachite Green, Mercuric Chloride, Crystal Violet and other dyes. Acriflavine has been found to be 20 times more powerful against *Staphylococcus aureus* than Mercuric Chloride and 800 times more so than Phenol or Chloramine-T in these conditions of testing.

With regard to the second point, the authors claim that most antiseptics are very inimical to phagocytosis, hence their action is a very mixed blessing. The higher the germicidal power in the presence of blood serum and the lower the hindering of phagocytosis the more useful is the antiseptic.

Acriflavine Solution 1 in 1,000 does not interfere with phagocytosis (For methods of estimating influence of antiseptics on leucocytes *in vitro* see Wright's Method and *in vivo.*—C. J. Bond, B.M.J.ii./17,71.

The **Therapeutic Coefficient** ("T.C.") of Browning is the ratio between the highest concentration of the substance, which does not reduce the phagocytic count below half that of the control, to the weakest concentration of the body, which is sufficient to kill *Staphylococci* in the presence of serum. Acriflavine and Brilliant Green gave the highest ratios. Acriflavine is less irritating to conjunctival epithelium than Brilliant Green. Both stimulate granulation in wounds.

The "T.C." of Acriflavine is 200, *i.e.* it kills both *cocci* and *B. Coli* at a concentration of 1 : 100,000, whereas to affect phagocytosis a concentration greater than 1 : 500 is requisite.

T.C. of Mercuric Chloride is $\frac{10000}{7000}=1{\cdot}4$; of Phenol $\frac{250}{500}=0{\cdot}5$, and so on.

The germicidal value of Acriflavine on staphylococcus in Broth and in human serum and in pus was found lower than that given by Browning. Its action too is very slow, not less than 24 hours' contact being adopted by Browning for the experiments. Staphylococcus in pus is not killed by 1 in 1000 Solution. —R. T. Hewlett, L. ii./17,493,727.

Browning turns the table by replying that the view that a substance to possess therapeutic value as an antiseptic must rapidly kill organisms is a time-hallowed test—witness phenol and mercuric chloride which do not put an end to suppuration in an infected wound.—*ibid*—p. 622.

A. Fleming issued a strong criticism of use of Acriflavine maintaining that its use is "therapeutically unsound" and that there is nothing to specially recommend it for use to septic wounds. A concentration of 1 in 2000 he finds inhibits leucocytic emigration, that even 1 in 3200 strongly agglutinates human red corpuscles, that 1 in 500 solution is usually unable to sterilise an equal volume of pus from a wound in 24 hours, that 1 in 500 injected into the pleura or peritoneal cavities loses its antiseptic power in 2 hours.—L.ii./17,341, An equally powerful reply by C. H. Browning.—*ibid*, 437. A. Fleming's rejoinder.—*ibid*,508.

Strengths for Use.—Solutions of 1 in 1,000 in normal saline are recommended. This strength (= on the basis of bactericidal concentration to an 80% Phenol solution in the case of *Staphylococci*) is used to the surface of wounds without causing pain or local irritation.

The dye is advised for prompt use to wounds soon after infliction to prevent sepsis, by destruction of virulent organisms before they have had time to gain a foothold and to multiply extensively—*e.g.* for casualty work at hospitals, this solution may effect healing by first intention.

The muscles round the site of an infected wound may be injected with several ounces of 1 : 1,000 solution without ill effect.

Use in conjunction with Hypertonic Saline.—The 1 in 1,000 solution is not precipitated by adding Sodium Chloride up to 5% strength or by 0·5% Sodium Citrate.

Suppurating Wounds.—Acri- or Proflavine solution 1 in 1,000 is used to swab out the open wound once or twice a day *after free drainage has been secured.* All the crevices of the wound are to be reached and sloughs, etc., removed. Then lightly pack with gauze steeped in the solution and cover with a piece of "protective" to prevent evaporation. Several ounces of the solution may be safely left in the tissues or peritoneal cavity. In cases showing spreading inflammatory conditions, it is well to inject the antiseptic into the part and especially around the edges with a hypodermic serum syringe.

When the infection has been practically overcome weaker solutions, *e.g.*, 1 : 5,000 may be used or the treatment may be intermitted for a day every few days, dry dressing being substituted in the intervals, or "stimulating" applications, *e.g.*, Brilliant Green solution 1 in 1,000 may be employed.

Inlet tubes may be used, but frequent periodic flushing, *e.g.* every two hours, with an aqueous solution (Carrel's method) is to be *avoided.*

One must recall that suitable concentration of serum is required to produce the full activity of these antiseptics. Brilliant Green in 1 in 2,000 solution is, however, much more powerful than these bodies in aqueous solution, but rapidly inactivated by serum; this latter dye has given good results by Carrel's method.

Gauze steeped in the solution is specially favoured as the dressing need only be changed once or twice in 24 hours.

Prophylactic Use before onset of Suppuration.—A contaminated wound (apart from war conditions) within the first few hours of infliction, if thoroughly cleaned with 1 in 1,000 solution —as much as possible being left in the cavity—may be sewn up and will heal by first intention. The same result may be expected in war wounds if similar facilities are permitted, but the thoroughness conducted in civilian practice is not always possible in advanced positions in the field. On the whole the immediate suture of war wounds after cleansing with Acriflavine is not favoured. It is better to pack the wound with the soaked gauze for three or four days after requisite surgical procedure. Suppuration may thus be aborted in many cases, and the wound may be sewn up if there is no obvious contraindication. Inject the solution into the surrounding tissues and muscle planes with a syringe and fine needle as previously mentioned if there is extensive damage to the tissues.

The use of Acriflavine is also advocated at the time of secondary operations to prevent the recrudescence of sepsis when operating in an area already affected.

Intravenous Injection.—The preparation has been tried even to the amount of 300 Cc. of 1 in 1,000 solution without ill effect. The injection is given slowly—at the rate of 50 Cc. per minute. The method has not been largely practised.

Subcutaneous and **Intramuscular** injections of 5 to 10 Cc. of 1 in 1,000 solution have been given.

Emulsion of Acriflavine in Liquid Paraffin 1 to 1,000.

Thoroughly clean and sterilise with spirit a pestle and mortar of ample size. Place 0·1 Gm. Acriflavine in the mortar, thoroughly powder and dissolve in 1 Cc. of Alcohol 90%. The substance may not dissolve entirely. Samples vary, but at any rate the particles should be made into as fine a condition as possible.

Place 1 Gm. of White Wax B.P. in an enamelled saucepan, melt it carefully, and add 99 Cc. of Liquid Paraffin, and heat together to 110 or 120° C., then gradually add this mixture to the Acriflavine in the mortar with continual stirring. This produces an emulsion or suspension of 0·1% strength which is relatively permanent. Stronger or weaker dilutions may be prepared.—W. H. M.

Another formula.—Acriflavine 0·1, Thymol 0·005, White Wax 4, Liquid Paraffin 76, Water 20. Wounds and tuberculous glands well treated.—T. E. A. Stowell, B.M.J. i./19,244.

Acriflavine Soap Paste prepared by neutralising Stearic Acid 1 with Sodium Carbonate 1¾ and incorporating 0·1% Acriflavine, also a Starch Paste or Mucilage with 0·1%.—C. J. Bond, B.M.J. ii./17,6.

Literature on Acriflavine.

For the original paper advising the therapeutic use of this dye, see C. H. Browning, R. Gulbransen, E. L. Kennaway, and L. H. D. Thornton, B.M.J., i./17,73.

Report on 150 cases treated at Middlesex Hospital, about 50 per cent. being war wounds.—Stimulus to early formation of granular tissue is a marked feature.—Author states he has no hesitation in injecting Acriflavine into the tissues, and has never observed toxic action. Regards its use superior to any hitherto employed.—D. Ligat, B.M.J. i./17,78.

Acriflavine does not sterilise (bacteriologically) recent wounds. Various bacteria grow freely in wounds healed with it. It appears to cause a very superficial necrosis—a fibrinous membrane if used in strength of 1 in 1,000. In spite of presence of bacteria, there is a notable absence of inflammation and of septic infections. Healing by granulation is very slow—the growth of granulations is evidently checked by the presence of Flavine. It appears to be useful in form of gauze soaked in the solution when used as a first dressing to large open wounds and to limit the power for harm of pathogenic bacteria and to prevent inflammation of the tissues being caused by bacterial —Sir Anthony Bowlby, L. ii./17,640. Wounds treated were within 4 to 12 hours of infliction. Solution 1 in 1,000 in Normal

Saline but 1 in 5,000 for subsequent applications is enough. For Carrel's irrigation method 1 in 10,000. There was absence of all toxicity even in large wounds. The primary dressing need not be changed for two or three days.—H. Drummond and J. W. McNee, L. ii./17,640.

A simple Acriflavine packing subsequent to operative procedure enables the dangerous period of the first few days to be safely passed without the occurrence of gas gangrene or spreading pyogenic invasion of tissues. Reply to certain points in the last mentioned paper.—C. H. Browning and D. Ligat, L. ii./17,768.

Fifty cases treated. A 1 in 1,000 solution far from being innocuous produced deleterious effects on the entire process of healing, killing successive layers of the reacting tissue elements, including the essential vascular mechanism. A favourable feature, however, is that the patient is protected in some way from absorption of toxic products.—E. F. Bashford, J. N. J. Hartley and J. T. Morrison, B.M.J. ii./17,849.

Cases treated by the Carrel-Dakin method have been compared with Acriflavine cases in the last-mentioned paper—the C.-D. process is not of universal application on account of inherent difficulties in technique, but for ease of application, early cleaning of wounds, and abatement of reaction to absorption, the dye is admirable.—E. M. Pilcher and A. J. Hull, B.M.J. i./18,172.

Acriflavine is more potent than Proflavine. 1 in 4,000 thought efficient for a wound infected with *strepto.* or *staphylococci.*—W. Parry Morgan, L. i./18,256.

Threatened sepsis of knee joint aborted by injection of 30 Cc. of 1 in 1,000 Flavine.—W. H. Hillyer, L. i./18,103.

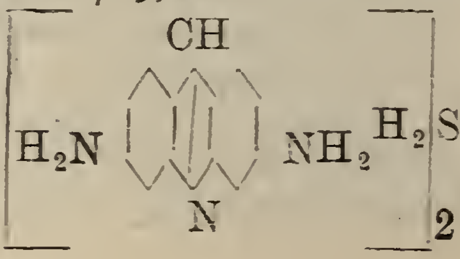
Extensive experience in relative value of this (gauze packs wrung out in 1 in 1,000 solution) to other antiseptics (the "old-fashioned" plain sterile gauze, Cyanide gauze, Boracic Acid, etc.). Not an excellent dressing but *relatively* a bad one. A film or coagulum forms on the surface in every case—not easy to remove.—M. Pearson, B.M.J. i./18,271.

Sepsis can be prevented by the primary use of Flavine-soaked gauze. Formation of a yellowish pellicle in three or four days is a sign for change to Eusol or Brilliant Green or Magnesium Sulphate.—H. M. Savery, B.M.J. ii./18,283.

In influenza epidemic Acriflavine spray 1 in 1,000 seemed to have some preventive effect. Permanganate gargle 1 in 5,000 was not effectual.—B.M.J. ii./18,111.

Gonorrhœa treated by lavage with 1 in H2,000 Acriflavine—one pint used twice daily.—D. Watson, B.M.J. i./19,571. See also H. E. Gibson, L. i./19,741. Also by 1 in 1,000 Acriflavine with 2% Alkali.—J. Armstrong B.M.J. ii./19,170.

Proflavine.—*Syn.* 3 : 6. - **Diamino-acridine sulphate.**



H_2SO_4=516·442.

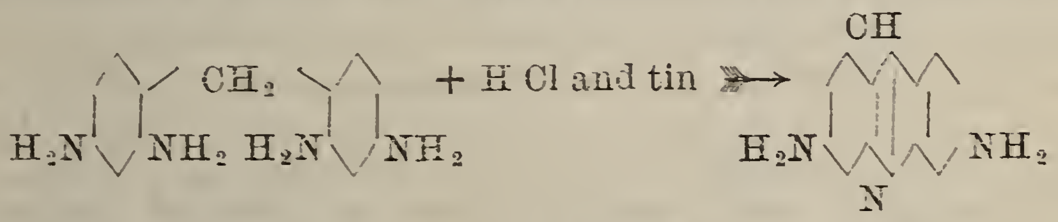
This aniline dye, it will be seen, precedes Acriflavine in manufacture by several steps—it is hence the cheaper of the two.

PATENT. The method of making is embodied in the Acriflavine Patents *q.v.* It is, however, also the subject of Casella's D.R.P. 230412 ("Maufacture of 3 : 6 Diamino-Acridine") British Patent 24652/1910.

This Brit. Patent covers the same ground as the two German Patents 230412 and 243085 (Acriflavine).

According to the description of procedure in Benda's paper (Ber. 1912, p. 1787) 250 Gm. Diamino Diphenyl Methane are added to 5 kilos Sulphuric Acid (66° Bé.). The temperature rises to 40° C. Cool to 0° C. and nitrate with 540 Gm. Nitrating Mixture (representing 160 Gm. Nitric Acid). Allow to stand for 2 to 3 hours. Add Ice 17 kilos and make alkaline with 7 kilos of Ammonia. Temperature not to rise higher than 45° C. Press off, wash with warm water and reduce by adding 2 litres Hydrochloric Acid Sp. Gr. 1·18 and warming to 50° C. and then adding Tin 450 Gm. The temperature rises to 110° C.

To effect closure of the ring the solution is now heated to 135° C. for 4 hours.



After cooling, the crystals are boiled with water 5 litres and treated with Ferric Chloride to oxidise any Hydro-Acridine that may be present. Now neutralise with Sodium Hydrate, boil again, draw off and wash the residue with boiling water.

From the combined filtrates a mixture of Diamino-Acridine and its HCl Salt crystallises out. This is converted into the Sulphate.

Chemical Note.—Though a diamine this body, as will be seen by the formula, functionates as a mono-acidic base. It is probably the N, rather than the amido groups which forms the Salt. Titration shows one molecule of H_2SO_4 *to two of base.*

It is in the form of a coarse brown powder. The concentrated aqueous solution is brown. It stains the skin yellow similar to Acriflavine. Dilute solution is also light yellow with fluorescence.

Solubility.—In water 1 in 140, in Alcohol 90% 1 in 48, in glycerin 1 in 10 or less, insoluble in liquid paraffin, oleic acid, vaseline and eucalyptol—(by our experiments, Aug. /17).

Incompatibles.—Similar to those of Acriflavine—*q.v.*

Antiseptic Powers.—This compound resembles Acriflavine in being strongly bactericidal for all the common pathogenic bacteria. Its power is likewise increased in the presence of serum. As weak a solution of Proflavine as 1 : 200,000, it is stated, will kill *staphylococcus aureus* in the presence of serum.

This compound and Acriflavine are comparatively little toxic for the body as a whole, and although Proflavine is slightly more inhibitory towards phagocytosis its general toxicity for mice as tested by subcutaneous injection and the irritating effect of concentrated solutions on the conjunctiva are markedly less than those of Acriflavine. They may be applied to the peritoneum with safety.—C. H. Browning and co-workers, B.M.J. ii./17,71.

Tablets.—1·75 grains each with sodium chloride. One dissolved in 4 ounces of sterile water produces a 1 in 1,000 solution in saline.

Proflavine Oleate 1% a proprietary ointment "made up with paraffin and calcium carbonate in about equal parts." For raw surface wounds.—B.M.J. i./19,152.

Uses.—Similar to those of Acriflavine, but it is stated to differ in that it exerts a degree of hæmostatic action.

Wounds treated with 1 in 1,000 solution. Primary sutures with excellent results. In one case out of 20 some stitches had to be removed. No difference between this and Acriflavine.—L. Colledge and co-workers.—L. ii./17,676.

Proflavine in 30 cases—disarticulations and amputations, compound fractures, wounds of joints and flesh wounds treated with 1 in 2000 solution in normal saline. Gauze packs for deep wounds after drainage and removal of foreign bodies. For open wounds folds of gauze used with solution added as required. The primary dressing removed on the third day. Wounds became clean in about 12 days. When the characteristic yellowish 'fibrinous membrane' formed a more stimulating antiseptic—Eusol was indicated.—R. B. Carslaw and W. Templeton, L. i./18,634.

Aniline. *Syn.* MONO-PHENYLAMINE, ANILINE OIL. $C_6H_5NH_2 = 93{\cdot}096$.

A brownish (when freshly prepared) oily liquid, with Sp. Gr. 1·027. Of burning taste, soluble in alcohol and oils, slightly in water.

Antidotes.—Fresh air, emetics, alkaline salt (NaCl) solution, sodium sulphate, artificial respiration, oxygen, transfusion.

Tetryl. *Syn.* TETRA-NITRO-METHYL-ANILINE. An explosive; causes dermatitis amongst women workers. Severe cases treated by steaming with subsequent application of wet cloths. This reduces swelling and allays irritation. It stains the skin yellow. Calamine lotion used with success subsequently, or an ointment of Zinc Ointment, Castor Oil and Lanoline. Lead lotion to be avoided; Lead has a dangerous affinity for Tetryl.—B.M.J. i./16,618.

Note.—Claessen (Fr. Pat. 355695, 1905) proposed this body and the Ethyl analogue as detonating explosives. Will (U.S. Pat. 827768, 1906) uses the same compound mixed with mercury fulminate.—Thorpe, *Vol. II.*, p. 467.

Aniline-Iodoform.—Iodoform 1 in Aniline Oil 10 (by weight).

P1 **Aniline-Cocaine.**—Cocaine (base) 5 in Aniline Oil 100 (weight)

These are employed in aural treatment.

Aniline Sulphate. $(C_6H_5NH_2)_2H_2SO_4 = 284{\cdot}268$. *Dose*—½ to 3 grains (**0·03 to 0·2 Gm.**).

Has been used for emphysema and asthma; must be used cautiously, as it may cause cyanosis.

Paraphenylenediamine. $C_6H_4(NH_2)_2 = 108{\cdot}114$

Prepared by nitrating Acetanilide and subsequent reduction with Tin and Hydrochloric Acid. In white or reddish crystals soluble in water, Alcohol and Chloroform.—M.pt. 140° C.

For use as hair dye, apply first a solution 2% with 1·5% Sodium Hydrate, then an oxidising agent, *e.g.*, 5% Ferric Chloride to give brown or 3% H_2O_2 to produce a black shade. May produce skin eruptions, eczema, etc., nausea or nervous symptoms, sleeplessness, dizziness, weakness, etc., or impairment of vision.—B.M.J. ii./09,812; P.J. ii./09,535. Should prohibit sale.—L. i./10,66.

Fur workers liable to be affected with traumatic dermatitis from this substance, as it is much used in dyeing.

The only cure when ladies are affected by skin eruptions from use of hair dye containing it is by shaving the head. It is cheaper than Silver Nitrate, hence probably reason of its use by hairdressers.—B.M.J. ii./09,918.

A Patent Specification says the addition of Sodium Sulphite 1 to 1 renders it harmless.—P.J. i./11,804, 823.

Mrs. Potter's Walnut Juice Hair Dye is well known to contain Paraphenylenediamine as active ingredient. A case of acute catarrhal eczema of the face and scalp caused by it yielded to the use of Iodine Ointment reduced one third strength by Petrolatum.—P.J. ii./12,301.

Though toxicity has been reduced by converting Paraphenylenediamine into Sulphate idiosyncrasies still occur. Tolylenediamine with Sodium Sulphite occur in 'Primal'—usually non-irritant.—B.M.J.E., Apl. 24/1914.

Orthotoluidine.—$C_6H_4CH_3NH_2 = 107{\cdot}117$

A colourless liquid turning brown on exposure to air and light and otherwise closely resembling Aniline. Sp. Gr 1·0037, B.pt. 199° C. *Soluble* 1 in about 70 of water.

Does not appear to have been used therapeutically.

Acidum Sulphanilicum. $C_6H_4NH_2SO_3H$, $2H_2O$ (1 : 4) = 209·188.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

In small white crystals, slightly soluble in water. Used in Ehrlich's Diazo Test, now deleted from this work. Iodism removed by daily administration of 15 grain doses of the Acid in 7 ounces of water.—L. i./09,396.

It is analgesic, and is best given as—

Sodii Sulphanilas. $C_6H_4NH_2SO_3Na$, $2H_2O = 231·18$.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

In white shining scales, easily soluble in water. Useful in acute catarrh, laryngitis, and otitis. Said to convert the harmful nitrites in saliva and nasal mucus into innocuous diazo bodies.—L.i./95,49.

Zinci Sulphanilas. *Syn.* *NIZIN. (T.M. 287163).
$(C_6H_4NH_2.SO_3)_2Zn. = 409·666$.

White crystals soluble 1 in 7 water, 1-in 250 Alcohol 90% (by our experiments). Solutions 1 in 500 to 1 in 250 are injected in the acute stage of gonorrhœa. In atrophic rhinitis the nasal fosæ packed with gauze dipped in 1 to 2% solution.—L. ii./08,738.

Anthrarobin. $C_6H_4C(OH)CH.C_6H_2(OH)_2 = 226·15$.

A light brownish powder, darkening with age, obtained by reduction from alizarin. A powerful deoxidising agent, soluble in weak alkaline solutions. 10% ointment in psoriasis, etc.

Benzol. FR. CX.—'Benzine.' (Avoid this way of spelling for this body.—W.H.M.) *Syn.* BENZENE (*Off.*). $C_6H_6 = 78·078$.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**), in capsule or oily solution.

A mixture of homologous hydrocarbons obtained from light coal tar oil. Sp. Gr. 0·880 to 0·887.

Antidotes.—See Poisons and Antidotes.

When swallowed it usually produces a sensation of burning in the stomach. It is a narcotic which, when swallowed or inhaled, produces vertigo, delirium and tonic convulsions, followed by deep sleep; 30 Cc. has proved fatal.

Uses.—For cough, and whooping-cough, and in influenza. It quickly destroys pediculi capitis or pubis, applied freely; one application sufficient.—For seborrhœa, should be brushed on the skin.

It has also been somewhat extensively tried in leukæmia.

It has preservative action on organic matter, *e.g.*, 2 drops preserved 8 ounces of Infusion of Gentian several days in an open vessel.

This body is entirely distinct from **Petroleum Benzine** or **Benzoline,** obtained in the fractionation of the hydrocarbons in Shale. Petroleum Ether and Petroleum Benzine are used for heating cauteries for nævi, &c.

Benzol is not suitable for this purpose—it burns with a smoky flame. It is, however, better for removing grease stains.

A test for it is to drop into a sample a few grains of Dragon's Blood. If the genuine article it is at once coloured; if it be the Petroleum article scarcely any effect.—C.D. i./08,464.

Michael Faraday discovered the body in the liquid of coal gas cylinders (as then used) calling it Bicarburet of Hydrogen C_1 H_6 It was renamed Benzole by him and Benzine by the French (who still adhere to the term—*vide* FR. CX.) Benzole would be the best name for this body (' ol ' being retained for Alcohols) Benzine. or better BENZIN, being kept for the petroleum distillate.

Benzol Capsules contain 5, 10 and 15 minims diluted with ½ volume of Olive Oil, also **Benzol ' Formagules '** same strength.

Leukæmia treated by large doses, *e g.*, 3 to 4 Gm. (45 to 60 minims approx.) Great improvement. The white corpuscles were reduced from 200,300 on February 16th to 8000 in May. The red corpuscles starting at 3,100,000, fell a little at first to 3,000,000, finally reaching 4,000,000. The treatment was the result of observing girls at Baltimore who had been working in a Benzol factory suffering from purpura hæmorrhagica and very severe aplastic anæmia.

3 to 4 Gm. daily for a month it is stated can be tolerated. Small dose-increase formation of white corpuscles. Polycythæmia with splenic enlargement also well treated.—Berl. Klin. Woch., July 15, 1912, per L. ii./12,250.

In leukæmia appears to have a quantitative and qualitative effect. In one case 208 Gm. were given in 63 days—the largest dose being 4 Gm. Blood count before treatment,—237,000 leucocytes, of which 24% were myelocytes. After treatment 13,200 leucocytes with scarcely one myelocyte. This author mentions *equal* volume of Olive Oil.—B.M.J.E. ii./13,55. See also B.M.J i./14,374.

A case of spleno-medullary leukæmia treated with doses ranging from 30 to 90 minims daily markedly improved. White cells dropped from 133,000 to 7,100 with corresponding increase in red from 2,400,000 to 4,175,000 also increase in Hæmoglobin from 40% to 75%. Nodular lympathic leukæmia treated with similar results but terminated fatally, likewise a case of lymphosarcoma. The question arises as to whether the improvement is permanent.—T. G. Moorhead, B.M.J. i./15,410.

A number of similar accounts have appeared. It would be well to treat cases with small doses at first and to note toleration or otherwise. Simultaneously blood counts.

We know of a case of lymphatic leukæmia which has been markedly improved by 15 m. Capsules with Olive Oil. Leucocyte count markedly reduced in a fortnight. As much as 2 drachms *per diem* of Benzol were taken.

Carcinoma treated by Benzol injections 0·1 to 0·3 Cc. Has local effect.—B.M.J.E. i./14,12.

National Association's Specification for Motors. Sp. Gr. 0·885. Sulphur not exceeding 0·4%. Distillation tests.—B.M.J. i./19,2·1.

Benzoyl Chloride. $C_6H_5.COCl = 140·535$. Mix Phosphorus Pentachloride 50 parts with Benzoic Acid 28 parts in an open pan in the fume chamber. When reaction ceases, distil. The first fraction coming over between 107° C. and 190° C. consists principally of Phosphorus Oxychloride, the Benzoyl Chloride distilling between 190° C. and 200° C. Sp. Gr. 1·218. Yield about 20 parts. Distinguish from **Monochlorbenzene** (*Syn.* **Benzol Chloride**), $C_6H_5Cl = 112·53$, Sp. Gr. 1·106, B.pt. 132° C., and **Benzyl Chloride** $C_6H_5CH_2Cl = 126·551$, Sp. Gr. 1·106, B.pt. 178° C.; also **Benzal Chloride,** *Syn.* **Benzylidene Chloride** or **Benzyl Dichloride,** $C_6H_5CHCl_2 = 161·003$, Sp. Gr 1·288, B.pt. 206° C.

Nitrobenzol $C_6H_5NO_2 = 123·08$, "Oil of Mirbane," has an odour similar to Benzaldehyde, and is used in cheap perfumery; it is a dangerous poison if used in sweetmeats. Deaths from.—L. i./06, 88,986. Another case of poisoning by a mouthful. Copper sulphate given as emetic; further treatment: Calomel and Bismuth. Recovery.—L. i./06, 1242. Fatal dose is about 1 Gm. Boot blacking caused poisoning.—L. ii./04, 1439.

Oil of Mirbane (Nitro-benzol), Poisoning by—placed on cotton wool for toothache. Recovery under 0·2 Gm. Caffeine hypodermically.—B.M.J.i./12 183.

Antidote.—Strychnine hypodermically and stimulants.

Nitrobenzol can be reduced electrolytically to **Azoxybenzol** $C_6H_5N:O:NC_6H_5 = 218·16$; **Azobenzol** $C_6H_5N:N.C_6H_5 = 192·16$; **Hydrazobenzol,** $C_6H_5NH.NHC_6H_5 = 194·176$; and Aniline, $C_6H_5NH_2 = 93·096$. Preferable to chemical means.—P.J. i/16,3.

Dinitrobenzol, $C_6H_4(NO_2)_2 = 168·082$. Formed by treating Benzol with a mixture of fuming Nitric Acid one vol. and Concentrated Sulphuric Acid one vol. The *ortho-* body has melting point 117° C. *Meta-*, melting point 90° C. *Para-*, 172° C.

Trinitro-Benzol. $C_6H_3(NO_2)_3(1:3:5) = 213·084$. Crystalline leaflets melting at 121° C.

Manufacture.—Heat *Meta*-dinitrobenzol 60 with fuming sulphuric acid 1,000 and Nitric Acid (Sp. Gr. 1·52) 500, for a day at 100° C. and for 4 days at 110° C. The yield depends a good deal on the length of heating and other conditions. We found this method (Beilstein Erg. 3 Aufl. ii. p. 49) to work better than that given in Watts. The Trinitro body is separated by pouring this reaction mixture into water (5 or 6 vols.).

Benzyl Benzoate. *Syn.* ✱**Spasmodin** (T.M. 398016). $C_6H_5CO.O.C_7H_7 = 212·156$.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**) of 1 in 5 Alcoholic Solution in water or as *emulsion, vide* below.

A liquid with aromatic odour, Sp. Gr. 1·1 as occurring in commerce. It should be mentioned, however, that the pure substance is in white crystals melting at 20° C. (Fluid at 19° C). The preparation of commerce is physiologically pure, but cannot be guaranteed 100%—the difference would be Benzyl Alcohol.

Manufacture.—From Benzyl Alcohol and Benzoyl Chloride (Kraut, Ann. 152,130). Also by heating Benzaldehyde at 100° several days with a small quantity of Sodium Benzylate.

It was found that Papaverine, which is probably a Tetra-methoxy-benzyl Isoquinoline, had the effect of inhibiting contractions of the ureters and lowering the tonus of plain muscle whilst the Pyridine Phenanthrene group represented by Morphine was found to stimulate contraction and increase tonicity. Benzyl esters were therefore examined and found to act on smooth muscle of the viscera in a similar way to the first mentioned alkaloid—the benzoate being finally selected for use.

Uses.—It is practically non-toxic and has been used in excessive intestinal peristalsis, diarrhœas and dysentery, intestinal biliary and renal colic, spastic constipation, vesical spasm, uterine colic, arterial spasm and bronchial spasm of true asthma. Might be of service in dysmenorrhœa.

Emulsion of Benzyl Benzoate.

Dose.—½ to 2 drachms (**2 to 8 Cc.**) every two hours as required.

Benzyl Benzoate 1 Cc., Mucilage of Acacia 5 Cc., Aromatic Elixir 35 Cc.—D. I. Macht., Jl. Am. M.A. 1919,73,599,603, P.J. Sept. 13/19.

Benzyl Acetate. $CH_3CO.O.C_7H_7 = 150·125$.

Oily fluid smelling of pears made from Benzyl Alcohol, Acetic Acid and Sulphuric Acid or by boiling Benzyl Chloride with Alcoholic Potassium Acetate. Formed also by boiling a mixture of Benzoic Aldehyde and Glacial Acetic Acid with zinc dust.—(Watts.).

Toluol (**Methyl-Benzol**) $C_6H_5CH_3 = 92·099$ and **Xylol** (**Dimethyl-Benzol**) $C_6H_4CH_3CH_3 = 106·12$ have chemical and physical properties allied to Benzol. The 1 : 2 Xylol boils at 141°, 1 : 3 Xylol boils at 139°, 1 : 4 Xylol boils at 138°.

Xylol. *Syn.* **Xylene,** unless otherwise specified, is a mixture of the three modifications. In *dose* of 5 to 15 minims in capsule rendered less likely to dissolve in the stomach juice than in the intestines; has been employed in respiratory affections and in dyspepsia, and has also been suggested for use in certain skin diseases consequent on the latter.

A small quantity of Toluol added to a fresh vegetable infusion has a remarkable preservative action as Benzol above. As **solvent naphtha**, a mixture of toluol and xylol—obtained in distilling coal-tar—is used on a commercial scale as a solvent for indiarubber. Agitation for days of the finely comminuted material with the solvent is needed. (Solvent Naphtha commercially may now be of much higher B. pt. *c.f.* Mineral Naphtha.).

Scarlet Colors.

Some confusion seems to exist as to the **Scarlets**:—

Biebrich Scarlet, according to Schultz & Julius (Systematic Survey of Organic Coloring Matters 1908) is the Sodium salt of Sulphobenzene-azo-sulphobenzene-azo-Betanaphthol, soluble in water giving an orange-red solution.

"**Scarlet R.**" is the Sodium salt of Xylol-azo-Betanaphtho monosulphonic acid, also water soluble.

Bordeaux Bx is the Sodium salt of Xylol-azo-Xylol-azo-Beta-naphthol-Beta-monosulphonic Acid: soluble in water.

Toluol-Azo-Toluol-Azo Betanaphthol. *Syn.* **Fett Ponceau R.** is insoluble in water, but soluble in spirit and in Chloroform and in fats.

The last mentioned has been relatively unobtainable during the war and has been replaced by:—

Benzol-azo-Benzol-azo-Betanaphthol, *Syn.* **Cerasine Red.** It is also insoluble in water, moderately in Alcohol and very soluble in Chloroform and Ether (by our experiments). This body is generally suitable for medicinal purposes.

Uses.—To regenerate skin and to hasten epitheliation. As ointment 2 to 8% Scarlet has been much employed.

Aurinaria of Scarlet 5% strength are prepared for aural treatment.

Unguentum Scarlet 2 to 8 %, or as required in Unguentum Lanolini.

Old ulcers markedly improve. The ointment should not be left on more than 48 hours, or marked irritation may occur. In corneal ulcers favourably reported on.—Pres. Jan. 1911, p. 4.

Ulcers, 80 cases. In the majority it was given for intertrigo of the ear, or of the napkin area, and seemed to improve in even 24 hours.—L. ii./11,1043

Should not be used on fresh wounds, and in granulating wounds only a thin layer of ointment should be applied on the edges.—H. M. Lyle, Med. Rev. Nov. 16/12, per Pres. Feb. 1913.

In rodent ulcer 2% Scarlet Ointment efficacious after Carbon Dioxide and removal of the eye.—Pres. Nov. 1912,299.

In traumatic corneal abrasions and corneal ulcers a 1% ointment with vaseline or Vaseline and Lanolin equal parts successful. For granulating postaural wounds in acute mastoid disease a 2 to 4% ointment on gauze or lint with good results.—F. Allan on Value of Scarlet Ther. Gaz., Jan. 1913, p. 1.

Headache, giddiness, intense epigastric pain and vomiting following use of Scarlet Ointment (8%). 6% found satisfactory.—L. ii./12,1678.

Action of Scarlet upon 'X' rayed skin. In old 'X' rayed skin (2 to 15 months previously) of the rabbit's ear the injection of a solution of Scarlet

Red is followed by epithelial proliferation which may reach an extreme degree provided the destructive effect of the 'X' radiation has not been excessive. A marked tendency to sloughing is seen when the dye is injected into old 'X' rayed tissues,—the tendency being greater the more marked the extent to which the appendages of the skin have been destroyed.—J. O. W. Barratt, L. i /13,454.

Biebrich Scarlet 5, Hard Paraffin 12·5, Soft Paraffin 82·5 suggested. The basis should be of consistence that the ointment will just come away cleanly with the dressing and at the same time not too hard for perfect contact.—P.J. i./17,268.

As a contrast stain in histology after use of Hæmatoxylin or Methylene Blue to define nuclei of cells. 1% aqueous solution of Biebrich Scarlet for 2 to 5 minutes is useful. Does not overstain or discharge colour of the nuclei.—A. K. Gordon, B.M.J. i./17,828.

Non-Staining Scarlet. Amido-Azo-Toluol is used for promoting the growth of skin like the above.—P.J. ii./11,316.

"T.N.T." Tri-nitro-Toluene, *Syn.* **Trotyl,** $C_6H_2CH_3(NO_2)_3$= 227·105.

Commercially it is seen as crumbs or granules or fine plate crystals. Melting point about 80° C. It is obtained by nitrating Toluene. Soluble in Acetone, Ether, Benzene, and Xylol.

As an explosive it has replaced Picric Acid. 'T.N.T.' is more stable and does not attack metals. When absorbed, mainly through the skin, it leads to serious digestive trouble. It further induces hæmolysis and cyanosis. The brunt of the mischief falls on the liver.

Stomonal, consists approximately of Nitroglycerin 11, Ammonium Nitrate 57½, Sodium Nitrate 7, Sodium Chloride 20½, Wheat Flour 8½, Moisture 1.

AMATOL is T.N.T. mixed with 40 to 60% of Ammonium Nitrate. Mixed with 20% it is AMMONAL.

T.N.T. and "Stomonal" dermatitis. A pigment of Camphor 2 drachms, Phenol 1½ drachms, Mercuric Chloride 15 grains, Picric Acid ½ drachm and Alcohol 6 ounces = 6 drachms, useful. Dabbed on by the medical man freely—not given to the patient—on inflamed and itching parts (not on irritable mucous surfaces). Especially valuable in the early pruriginous stages. For home use two ounces of the pigment mixed with a Calamine Lotion 4 ounces and ½ drachm of Acacia Gum added.—K. Prosser White, L. i./16,402.

Effects of T.N.T. on women workers. Irritative and toxic symptoms thoroughly described with recommendations for prophylactic and symptomatic treatment.—A. Livingstone-Learmonth and B. M. Cunningham, L. ii./16,261.

Ministry of Munitions on T.N.T. and poisoning. It has produced 50 cases of fatal toxic jaundice out of many thousands of workers engaged. Accurate account of dermatitis, digestive troubles, blood changes, and jaundice caused.—B.M.J. ii./16,842; L. ii./16.1026.

Sodium Bicarbonate freely given; successful treatment.—B.M.J. i./18,450

T.N.T. Effect on the blood. No adverse effect on the red cells and hæmoglobin. Appreciable increase in leucocytes. Cyanosis is common among workers—possibly production of NO–Hæmoglobin or methæmoglobin—P. N. Panton, L. ii./17,77.

Three grains in 1 grain doses taken experimentally. Urine becomes orange colour.—Walter Smith, B.M.J. i./17,618.

Tests for T.N.T. In the free state a weak ethereal solution gives a deep red with caustic potash—preferably in alcoholic solution.

Webster's Test for detection in the urine. 12½ Cc. of the Urine mixed with an equal volume of Sulphuric Acid 20 : 100 and shaken with 10 Cc. of ether. The acid liquor is rejected and the ether washed once with 25 Cc. of water. Then treat this Ether solution with 5 Cc. of Alcoholic Potash Solution 4 or 5 : 100. When T.N.T. is present a purple colour is at once formed varying in intensity. Care must be taken to distinguish between absorbed T.N.T. and accidental contamination.—B. Moore, Medical Press, 1916, 153, 537 See also B.M.J. i./17,618 and especially L. ii./16,1029. Also modification to exclude possible errors through consumption of rhubarb etc. —F. Tutin, L. ii. 18,554.

For recent works on T.N.T. and other explosives see 'High Explosives'—E. de W. S. Colver, 1918; "T.N.T. and Mono- and Di-Nitrotoluene, their manufacture and properties"—G. Carlton Smith, 1918; and "Explosives," by E. de Barry Barnett, 1919.

Trinitro-Butyl-Toluene $C_6HCH_3C_4H_9(NO_2)_3$ is synthetic Musk or Tonquinol.

Chinolinum. *Syn.* Quinolin $C_9H_7N = 129{\cdot}111$

Dose.—3 to 10 minims (**0·2 to 0·6 Cc.**).

A colourless liquid, with peculiar odour, soluble in alcohol, but insoluble in water. Prepared by the oxidation of nitro-benzene and aniline. Is used as—

Chinolini Tartras.

$(C_9H_7N)_3,[C_2H_2(OH)_2(COOH)_2]_4 = 987{\cdot}565.$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in chloroform water, with Syrup of Orange, or in cachet.

Glistening, white acicular crystals, nauseous in taste, and ***soluble*** about 1 in 80 of water. Antiseptic and antipyretic, *e.g.*, in enteric and intermittent fevers, useful in neuralgia.

Oxyquinoline Sulphate. *Syn.* **Superol,** $(C_9H_5N.OH)_2.H_2SO_4 = 388{\cdot}298.$
✱Chinosol.

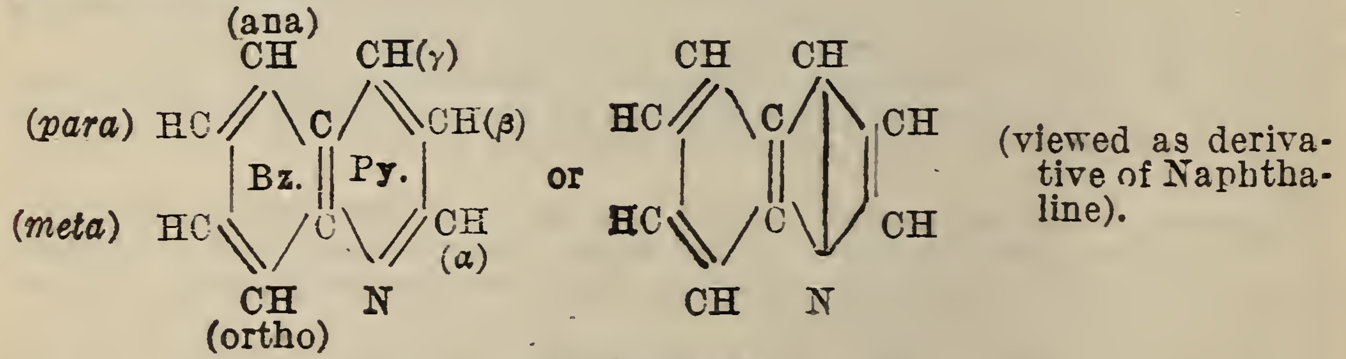
Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

TRADE MARKS: CHINOSOL Nos. 220003 (Class 1: No claim for "Chino"), 221896 (Class 2), and 221898 (Class 48), registered in 1899. Registrations renewed in 1912 and 1913.

PATENT: No. 1409 of 1896, "An Improved Manufacture of an Antiseptic Disinfectant," granted to the owners of the trade mark. The patent ***expired*** in 1909.—Per C. D., Aug. 1915.

The above patent deals with the 'heating of oxyquinoline with Potassium Pyrosulphate.'

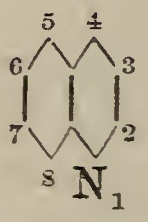
The substance was originally stated to be Potassium-oxyquinoline Sulphate but the content of Potassium in the original article of Commerce does not agree with theory:



QUINOLINE.

Manufacture.—A glance at the above formulæ for Quinoline shows that there are seven Hydrogen atoms which could be substituted by Hydroxyl.

The Oxyquinoline (Hydroxyquinoline) required for making Oxyquinoline Sulphate is the ORTHO- body. The body in question according to the Geneva Congress on Nomenclature 1892 is 8-Oxyquinoline, the formula being numbered thus:—



This may be prepared by heating Quinoline several days with ten times its quantity of fuming Sulphuric Acid on the water bath or by heating 1 part Quinoline with 3½ parts of the acid to 170° C. to produce the *Ortho*-Sulphonate:

$C_9H_6N.SO_3H$. This body is then fused with Caustic Soda to produce the *Ortho*-Oxyquinoline $C_9H_6N.OH$.

To Manufacture Quinoline (assuming it is not available as a commercial article in sufficient purity), it is necessary to mix intimately Cinchonine 1 part with 3 to 4 parts of Potassium Hydroxide and 0·25 to 1 part of water and submit them to fusion and destructive distillation at a moderate temperature. The distillate is then neutralised with Hydrochloric Acid, evaporated to dryness to volatilise other substances, and the Quinoline thrown out from the residue with Caustic Potash and submitted to repeated fractional distillation after drying with Calcium Chloride.

A synthetic method (Konig & Skraup's) would, however, be better:—

Nitrobenzol 240 Gm., Aniline 380 Gm., and Glycerin 1200 Gm. are mixed in a large vessel and Sulphuric Acid 1000 Gm. added. The mixture, which becomes warm, is shaken until the Aniline Sulphate formed redissolves, and is then *cautiously* heated with a large wide reflux condenser (an intense interaction occurs in 5 to 10 minutes necessitating removal of the source of heat until the boiling has subsided).

Now heat to boiling until there is no further evidence of unaltered Nitrobenzol in the condenser (2 to 3 hours). Dilute the brown liquid after cooling with several times its volume of water and pass steam into it until the odour of Nitrobenzol has completely disappeared.

Render the distillation residue strongly alkaline with Sodium Hydroxide and distil off the free base in steam.

The yield is stated to be 70 to 75% of the Nitrobenzol-Aniline mixture.

The Quinoline can be purified by dehydrating with fused Caustic Potash and fractionating—collecting the fraction 227 to 228° C.

Schmidt states it is useful, to moderate the violent initial reaction, to heat the Nitrobenzol alone in a vessel with reflux and separating funnel and to add the mixture of Aniline, Glycerin and Sulphuric Acid, kept warm separately on a water bath, in small portions by aid of the separating funnel.

The Quinoline is now Sulphonated, and the Sulphonic Radical replaced by Hydroxyl as above stated.

Skraup, Monatshefte 3, 536, makes Oxyquinoline direct from a mixture of *o*-Nitrophenol, *o*-Amidophenol, Glycerin and Sulphuric Acid.

We have experimented on this preparation on the above lines and at the time of going to press had little success with it. The body Oxyquinoline readily undergoes oxidation, and care must be taken to prevent it.

We were surprised to find on examination of the commercial article that it contained approximately only 5% of Potassium Sulphate.

Theory for a body of composition $[(C_9H_6.N.OH)_2H_2SO_4.K_2SO_4]$ for example would show 30% K_2SO_4 approx.

Characters and Uses.—Yellow crystalline powder, M.pt. 175 to 177° C. readily *soluble* in water, sparingly in alcohol. A 2% solution checks surface hæmorrhage and for scalds. 1 in 1,000 for the hands. In chronic eczema 1 in 200 combined with Lotio Calaminæ Oleosa (*q.v.*).—B.M.J. i./09,1341.

Tablets 5, 8, and 15 grains. One of the latter in a pint of water is said to be equal to Phenol 1 in 40, as an antiseptic. **Gauze**, 3% 6 yd. pieces.

Chinosol with Formaldehyde Intravenous Injection.—

In treatment of pulmonary tuberculosis 50 Cc. of a 1 in 2,000 solution of Formaldehyde plus 1 in 4,000 solution of Chinosol injected into the median-basic or median-cephalic vein repeated daily, the strength being gradually increased. Not advisable to increase the Formaldehyde above 1 in 500. Action beneficial.—L. ii./10,1408,1505; L. i./12,296.

Acidum Phenylcinchoninicum, U.S. *Syn.* **Phenoquin**, *ATOPHAN (T.M. 331473).

PATENT 15,684/12, "Improved process for Manufacture." There are numerous other patents to which reference should be made, *e.g.*, 12,053/12.

Dose.—30 to 45 grains (**2 to 3 Gm.**), daily for 3 or 4 days.

Tablets 4 grains (0·25 Gm.) eight to twelve daily; 8 grains 0·5 Gm.) four to six daily.

A yellowish cream-coloured amorphous powder of the composition 2-Phenylchinolin 4-Carbonic Acid. Is said to facilitate the elimination of uric acid from the organism in gout and rheumatic affections.—L. ii./11,1143 and in neuralgia and sciatica.

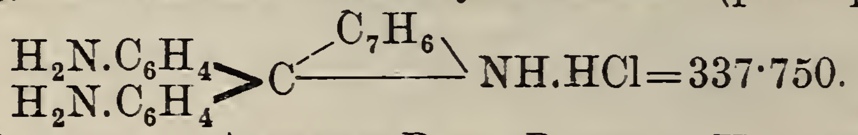
Incompatible with Sodium Bicarbonate and other alkalies *in vitro.* We did not find it incompatible with Potassium Iodide.

It is advised to give Sodium Bicarbonate, 225 grains (15 Gm.) the first day and 75 to 150 grains (5—10 Gm.) the following days, in addition to the atophan, to avoid setting uric acid free in the urine.

Increased excretion of Uric Acid confirmed. Four cases of gout and one of albuminuria treated, the uric acid in urine rose and that of the blood sank. The increased output is due to elimination of accumulated uric acid in the blood, due to kidney inefficiency.—Folin and Lyman (J. Pharmacol. expt. Ther., 1913,4,539—546), ex J.C.S.A. i./14,115.

In two gouty cases the drug was thought to be much less active with regard to elimination of Uric Acid than in healthy subjects. It had hardly any action in doses of 1 to 2 Gm. Its action is little understood—it probably consists in decomposition of a larger quantity of Nucleoproteids or in some alteration in those fermentative processes which regulate the oxidation of the purin bases.—L. i./15,1092.

Fuchsine.—**Rosaniline Mono-Hydrochloride** (principally).



$$\left.\begin{matrix}H_2N.C_6H_4\\H_2N.C_6H_4\end{matrix}\right>C\overset{C_7H_6}{\overline{\qquad\quad}}NH.HCl=337{\cdot}750.$$

Syn. MAGENTA ; ANILINE RED, RUBINE, HARMALIN.

Dose.—½ to 4 grains (**0·03 to 0·25 Gm.**), in a pill.

Iridescent crystals, forming a deep-red solution for staining *B. tuberculosis.*—*Vide* Clinical and Bacteriological Notes.—*Vol. II.*

Soluble in alcohol 1 in 8

Given in renal albuminuria. Must be arsenic-free.

Unguentum Fuchsin 5% in Soft Paraffin. Carbuncle and soft chancre well treated.—L. i./14,1502.

Rosaniline (*Syn.* **Roseine**) **Acetate.**

$C_{20}H_{19}N_3.\ C_2H_4O_2+5H_2O=451{\cdot}404.$

Dark red crystals ***soluble*** in water and in alcohol. Both these bodies are sometimes called 'Roseine.'

Methyl Violet. *Syn.* **Pyoktanin.** In green crystalline powder, *soluble* 1 in 20 of water, 1 in20 of alcohol 90%, also in Glycerin 1 in 15, and in Oleic Acid. Insoluble in Liquid Paraffin and Vaseline—by our experiments. A mixture of the hydrochlorides of penta and hexa methyl-para-rosanilines, $C_{19}H_{12}(CH_3)_5N_3.HCl = 393{\cdot}834$ and $C_{19}H_{11}(CH_3)_6N_3.HCl = 407{\cdot}855$. Dilute solutions have been locally injected and applied for malignant growths. A yellow variety of Pyoktanin, an **Auramine**, $C_{17}H_{21}N_3HCl = 303{\cdot}751$. *Soluble* 1 in 80 of water and 1 in 105 of Alcohol 90%. **Gentian Violet** is also a trade name of Methyl Violet

See also under Brilliant Green.

Malachite Green. *Syn.* **Benzaldehyde Green.**

Characters.—This is chemically either the Zinc double chloride or oxalate of Tetra-methyl-di-para-amido-Triphenyl-carbinol: $(C_{23}H_{25}N_2Cl)_3 + 2ZnCl_2 + 2H_2O$ or $(C_{23}H_{24}N_2)_2 (C_2H_2O_4)_3$.

The former is in brass yellow prismatic crystals while the oxalate is in green metallic glistening plates (Schultz & Julius).

Solubility.—The Zinc Double Salt by our experiments is soluble in water 1 in 20, very soluble in Alcohol, in Oleic Acid 1 in 14 (?) in Glycerin 1 in 7 (?), totally insoluble in Liquid Paraffin, Vaseline and Eucalyptol. The Oxalate is also soluble in water and Alcohol.

Uses.—During the war has been much employed as an antiseptic wound dressing—especially as spray.

Stains on the hands with Malachite Green are easily removed by rubbing with a little cotton wool soaked in either Alcohol or dilute Hydrochloric Acid or dilute Acetic Acid.

Cheatle's "Green Spray," *Syn.* **Sublimate Malachite Green Solution** composed of equal parts of 2% Malachite Green in 80% Alcohol and 2% Mercuric Chloride in 80% Alcohol (the two solutions are best kept separate and mixed as required) —proved satisfactory at Haslar.—W. G. Axford and G. L. Cheatle, B.M.J. i./17,535. The spraying must be thorough and the spirit allowed to evaporate before applying the dressing. *It must not be used to mucous membranes*

G. L. Cheatle found Malachite Green a potent antiseptic. It kills *Staphylococcus Aureus* in serum in a dilution of 1 in 2,000, while it kills *B. subtilis* spores in a dilution of 1 in 5,000. Its effect is more marked in the case of Gram+ bacteria, the commonest flora of war wounds. When mixed with Mercuric Chloride it does not diminish the effect of the latter.—L. ii./15,165. (Note that originally 1% of each ingredient in separate solution was advocated—subsequently *two* per cent.—W. H. M.)

The combination was found to "diffuse" well.—Sir Watson Cheyne, L. ii./15,672.

Valuable routine results from Malachite Green in naval hospitals. —Med. Res. Committee, B.M.J. i./17,769.

Injections of 1 Cc. of 1 in 2,000 solution in normal saline experimentally in trypanosomiasis.—B.M.J. ii./04,1449,1645; M.A. 1906,32,510. Further treatment; Quinine and arsenic preparations.

Induced immunity to further infection.—D.M.W., 1906,21,863.

Brilliant Green. *Syn.* Tetra - Ethyl - Diamido - Triphenyl - Carbinol in form of either Sulphate or Zinc Double Chloride (discovered 1879). For therapeutic purposes the *Sulphate* $C_{27}H_{34}N_2O_4S$. is to be used.

Characters.—Golden yellow crystals, *soluble* in water and in Normal Saline and in Alcohol, forming a green solution.

Chemical Examination.—Samples on the market which we have examined were mostly the zinc double salt and probably much of the dye that is sold as Brilliant Green is in reality Malachite Green, the latter being in the form of Oxalate.

Fuse with fusing mixture to liberate zinc if present, before employing usual tests.

Antiseptic Power.—C. H. Browning and his co-workers in their work on the use of Acriflavine (*q.v.*) found this substance to compare very favourably with Acriflavine in antiseptic properties though the latter is more rapid in action.

Uses.—The dye was much used initially on their recommendation as a substitute for the yellow dye, and is still much used, solutions of strength 1 in 1,000 being employed. As a dressing it is painless. These two dyes had the highest "T.C." (*v.*p. 295). Brilliant Green differs, however, in that it is not advised to be introduced by injection into closed spaces.

Brilliant Green is almost as strongly bactericidal as Hexamethyl-Violet for *Staphylococcus aureus*, *B. diphtheriæ* or *B. anthracis* (a concentration of 1 in 5 million completely inhibited growth of these organisms on agar, whereas 1 in 250,000 of Mercuric Chloride was required for similar result.). Hexamethyl-Violet, however, is so weak in its action on the coli-typhoid group as to render it of little value as an antiseptic against these organisms; whereas Brilliant Green is extremely potent in its action on the coli-typhoid group. Further, even in the presence of serum, Brilliant Green is very actively antiseptic. It is also highly inhibitory towards anaerobes, such as B. malignant œdema.—Browning & Gilmour, Jl. Path. and Bact. (Cambridge), Vol. xviii., p. 144.

The most powerful antiseptic investigated by a standard method using *Streptococcus fæcalis.* — Emery for Med. Res. Com., L. i./16,817; i./17,159.

Brilliant Green and Crystal Violet (Hexa or Penta-Methyl Violet or a mixture of these), 1% each in a mixture of rectified spirit and water equal parts used to sterilise the skin.—V. Bonney and C. H. Browning, B.M.J. i./18,562.

Stains on the skin can be removed with spirit, those on clothes by spirit or washing with soap.

Brilliant Green Ointment. Brilliant Green 1 or 2% dissolved in twice the amount of Alcohol 90% and incorporated with Soft Paraffin.

Epithelial stimulant in various minor injuries and affections, *e.g.*, impetigo, indolent ulcers of various kinds, superficial shell wounds involving only the skin, blisters, etc. Apply on a piece of lint the exact size of the part. Results remarkably good.—R. W. Hodgson-Jones, B.M.J. i./17,455.

Brilliant Green Paste (Hey's). Brilliant Green 1, Boric Acid 275, French Chalk 25, Liquid Paraffin 200. The Green is incorporated, dissolved in a little spirit. For filling wound cavities. —Wilson H. Hey, B.M.J. ii./17,445.

References.

Painless, non-poisonous, sterilises a wound in three days, needs dressing only about once in four days. Applied similarly to B.I.P.P. —A. Rendle Short, J. S. Arkle and C. King.—B.M.J. ii./17,506.

Wounds treated with 1 in 1,000 Normal Saline. Its use encourages formation of a moderate amount of "laudable pus." Results striking but not marvellous.—A. Leitch, B.M.J. i./16,236.

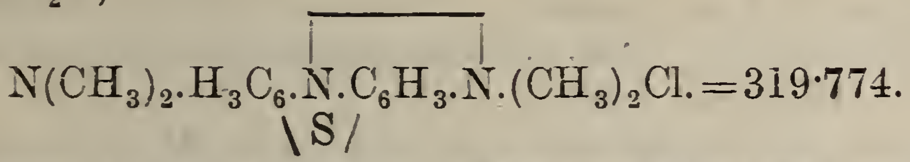
Non-irritant and effective. May be used with the salt pack and can be used by the **Carrel method** of repeated irrigation for which Flavine bodies are not suited.—C. H. S. Webb, B.M.J. i./17,870, ii./17,74.

Gunshot wounds well treated by 1 in 1,000 to 1 in 500 Brilliant Green Solution in Normal Saline, also 1 in 500 in 0·5% Chloretone. The last mentioned preferred. Painless. Produces exuberant but very vascular bright red granulations. May be used with advantage where anatomical conditions render primary excision impossible.— R. Massie, L. i./18,635.

Cholera Vibrio is particularly susceptible to Brilliant Green. Suggested use in man. Dogs tolerate 1/5th grain *per os.*—L. Nicholls, L. ii./17,563.

Methyl Green is **Chlor-Methyl-hexamethyl-*p*-rosaniline Hydrochloride.** *Syn.* LIGHT GREEN.

Methylene Blue, Medicinal.—*Syn.* METHYLTHIONINÆ HYDROCHLORIDUM. U.S. METHYLENUM COERULEUM, P. Helv., FR. CX. $(+3H_2O)$.



$$N(CH_3)_2.H_3C_6.\overline{N.C_6H_3.N}.(CH_3)_2Cl. = 319{\cdot}774.$$
$$\backslash S /$$

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in Pill, Cachet or Capsule; or hypodermically, 1 grain.

Dull dark green crystals, forming an intense blue solution in water. *Soluble* 1 in 50 —FR. CX. 1 in 20.

Incompatible with caustic alkalis.

Distinguish from the Commercial Compound with Zinc. Vide Vol. II.

Toxic effects of Methylene Blue possibly due to presence of Zinc Chloride. Presence of the latter sets up vesical and rectal irritation in malaria cases.—D. G. Marshall, L. i./17,276. We agree that metallic impurity of this kind is most undesirable.—W. H. M.

Night Blue (*c.f.* McCrorie's stains Vol. II.) and **Patent Blue A** are more suitable for colouring Perchloride Solution.—C. D., Jan. 25,13.

Uses.—Has been recommended as an analgesic, of service in rheumatism and painful nervous affections; also in malaria, ague, nephritis, and retinitis. *Colours urine blue, and fæces become blue on exposure to air.*

Chlorinated Soda Solution, *q.v.* will remove stains caused by it.

In cystitis, a 2 grain capsule should be given and the bladder washed out with 2% solution. In dysentery a rectal injection 1 in 5,000. In chronic suppurative otitis media and conjunctivitis —1 in 500 solution warm is instilled. In intertriginous eczemas, 3 to 5% solution.

In gonorrhœa, Hare suggests capsules of 2 grains, oil of sandal wood 3 minims, oleo-resin of copaiba 3 grains, oil of cinnamon 1 minim.

In ulcerative colitis irrigation with methylene blue, 2 to 3 grains in 1 pint have been tried.—B.M.J. i./09,770.

In Blackwater fever oedema appeared lessened by.—L. i./11,585.

In bilharzial disease.—B.M.J. ii./04,1694. Bilharziosis of the vermiform appendix.—L. i./06,672.

For Methylene Blue and other Tests of the Kidneys, see Vol. II

Purulent discharge (due to *Staphyloccocus aureus*) from the eye socket well treated by 0·1% Methylene Blue solution.—H. M. McIlroy, B.M.J. i./19,405.

Soudan Red III. AMINOAZOBENZENE-AZO-BETANAPHTHOL.

$C_{22}H_{16},N_4O. = 352{\cdot}278$. A brown dye for colouring fats, and in histology.

Chrysoidine.—DIAMIDOAZOBENZENE HYDROCHLORIDE.

$C_6H_5N_2C_6H_3(NH_2)_2HCl. = 248{\cdot}664$. An orange dye slightly soluble in water.

✶ **Kephaldol** (T.M. *See* 366512, 367064, 367065, 367066, 367067). *Dose.*—30 grains (**2 Gm.**). A proprietary said to be made from Phenetidin, Salicylic and Citric Acids. Antipyretic, stated to be free from evil after-effects.

A combination of Phenacetin 50%, Sodium Salicylate 32%, Quinine 4%, Citric Acid 5%.—B.M.J. ii./08,1376. P.J. ii./08,164, says Salicylic Acid 3% and 'some sodium.'

Phenacetinum. *Syn.* **Acetphenetidinum** (*Off.*), **U.S.** Fr. Cx. **P. Austr.** $C_2H_5O.C_6H_4.NH.COCH_3$ 1 : 4 = 179·164.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**), in cachets, tablets, or suspended in mucilaginous fluids. **P.G.V.** max. single dose 15 grains. Max. during 24 hours 45 grains approx.

An acetyl compound of Phenetidin, $C_6H_4(NH_2)\ OC_2H_5 = 137·138$ (the ethylic ether of paraminophenol). It is analogous to acetanilide (antifebrin). White, shining, laminar crystals, M. pt. 135° C., tasteless, ***soluble*** sparingly in water, 1 in 21 of alcohol (90%), and in sulphuric acid without colour.

Manufacture, Notes on.—*See Vol. II.*

Does not liquefy with sodium salicylate, but phenazone does, *e.g.*, Phenacetin 10 grains, Caffeine Citrate, 2 grains, Sodium Salicylate 5 grains, is not incompatible.

Phenacetin acts slower, but more enduringly than Phenazone. It is oxidised in the tissues and is excreted as sulphate and glycuronate compounds of acetyl-paramidophenol.—Gordon Sharpe, P.J. ii./15,198.

Uses.—Reduces temperature and soothes pain, very rarely causes rash or cyanosis. Successful in rheumatism, neuralgia, migraine, and hysteria. In first stage of influenza relieves headache and mitigates aching of limbs. Doses of 4 to 8 grains reduce temperature in cases of pyrexia, but effects are only of short duration.

Useful to control pains in tabes dorsalis.—L. i./10,355.

Toxic Effects.

72 grains of Phenacetin taken in error in an hour. Nausea and vomiting, cyanosis, breathing slow and laboured, pulse irregular, slow and weak. Treatment, 2 ozs. whiskey and 1/20 grain Strychnine hypodermically. Oxygen was freely given with marked effect on the cyanosis and respirations. Recovery.—B.M.J.i./11,1313; P.J. i./11, 772.

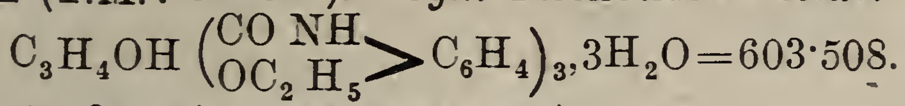
Poisoning by Phenacetin. Several 5 grain tablets taken—probably 60 grains in all or less. Patient's colour was a "deep dusky mauve," probably due to change in the blood owing to lack of oxygen. Recovery under stimulants; Strychnine, hot bottles, strong coffee, champagne and large quantities of hot water (*not* stomach tube). Other cases recorded.—P. Hamill & T. G. M. Hine. L.i./15,490.

Effervescent Phenacetin. *Dose.*—1 drachm (**4.0 Gm.**) or more. In two strengths, 5 and 10 grains in 1 drachm respectively.

Tablets 4, 5 and 10 grains. Also 4 grains with **Caffeine** 1 grain, also 2½ grains with **Sulphonal** 2½ grains. *Dose.*—1 or more.

Phenacetinum cum Caffeina Effervescens.
Dose.—1 to 2 drachms.
Contains 5% Phenacetin and 2½% Caffeine Citrate

✱**Citrophen** (T.M.: 226322). *Syn.* **Phenetidin Citras.**



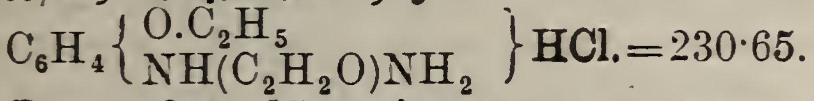
$$C_3H_4OH\left(\begin{matrix}CO\,NH\\OC_2\,H_5\end{matrix}\!>\!C_6H_4\right)_3,3H_2O=603{\cdot}508.$$

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

A combination of citric acid with paraphenetidin, in white powder, *soluble* in water (1 in 180), less in alcohol, antipyretic.

Phenocoll Hydrochloridum, Hydrochloride of Amido-acet-paraphenetidin, a derivative of Phenacetin.

TRADE MARK: The word Phenocoll alone is not registered. T.M. 157131 (1891) is a device embodying the word which was renewed in 1905. PATENT 5269/1891 ***expired*** 1903.



$$C_6H_4\left\{\begin{matrix}O.C_2H_5\\NH(C_2H_2O)NH_2\end{matrix}\right\}HCl.=230{\cdot}65.$$

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

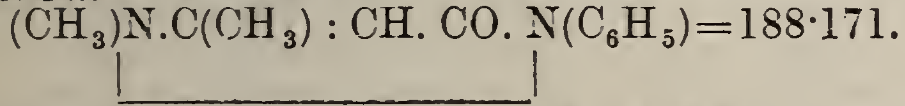
Manufacture.—By the action of Ammonia on Bromophenacetin.

A white crystalline powder with sharp saline taste. ***Soluble*** about 1 in 16 of water.

Combined with piperazin in effervescent form (*q.v.*) is specific in rheumatoid arthritis. Also beneficial in neuralgia arising from sudden cold. Also for headaches and pertussis (½ grain hourly). Successful in malaria; as a prophylactic.

Phenazonum. *Syns.* ANALGÉSINE, ANTIPYRINUM, DIMETHYL OXY-QUINIZINE, PHENYLDIMETHYL-ISO-PYRAZOLONE.

Note.—TRADE MARKS: ✱"Dr. Knorr's Antipyrine" was Registered by a firm, No. 42855/1885, renewed 1898 and 1913. The same firm registered (208865/1898) a label bearing the word Phenazon and device of 3 stars—'the essential particular being the device of three stars.' Renewed 1911. PATENT: 3097/1884 to the same firm remained in force 14 years now ***expired.***—Per C. & D.



$$(CH_3)N.C(CH_3):CH.\,CO.\,N(C_6H_5)=188{\cdot}171.$$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachets, tablets, or solution. **U.S.** *Average dose.*—5 grains.

Manufacture.—Condensation of Phenylhydrazine and Aceto-Acetic-Ethyl Ester followed by methylation.—C.D. ii./14. p. 273.

In white crystalline bitterish scales or powder. Gives a deep red colour with solution of ferric chloride, nearly discharged by diluted sulphuric acid.

Soluble 1 in 1¼ of water, about 1 in 1 of alcohol and chloroform, and 1 in 40 of ether.

Flavoring.—Glyl Menthæ Piperitæ, Glyl Rosæ, Syl Vanillæ; Aqua Menthæ Piperitæ, Syrupus Limonis, Syrupus Aurantii.

Given as an enema if contra-indicated by the mouth.

Uses.—It is an analgesic, reduces the temperature of fevers, and the pyrexia of pneumonia, pleurisy, phthisis, and erysipelas. In doses of 4 to 15 grains it relieves locomotor ataxy, chorea, migraine, facial neuralgia, rheumatism, and sea-sickness. Hypodermically for lumbago, sciatica, angina pectoris, biliary and renal colic, and dysmenorrhœa. A skin rash has at times been observed after its use, and in the past some poisonous effects were reported. Solution applied locally is hæmostatic

Antidotes.—Administer brandy or ether, atropine, strychnine or oxygen. Warmth to the feet and body.

Antipyrin was used by Lieut. Clark in the murder of Mr. Fulham in India—the amount given being 4 drachms. This appears to be the first time the drug has been used for murder.—P.J. i./13,325,349.

Phenazone acts quickly, but its effects soon pass off. It acts partly as phenazone and partly as oxyphenazone, and is excreted as such. Interesting details *re* discovery and early uses. In 1884 Guttman used it to reduce the temperature of enteric, pneumonia and pleurisy with such success that the Germans believed they had found a panacea for reducing temperature, and by this means also for "curing" all conditions associated with fever. They boasted of conducting such fevers at normal temperature by continuous dosage of the new drug. Antipyretics became an obsession like the possession of Paris or Calais at a later date.—Gordon Sharp, P.J. ii./15,198.

Poisonous effects from 10 grains. Recovery under Strychnine and Brandy.—L. ii./10,101.

Incompatible with spirit of nitrous ether, or other nitrites in the presence of free acid, an apparently inert bluish-green iso-nitroso-antipyrine being formed; also with the cinchona alkaloids, forming a precipitate which is soluble in weak acids.

Further, with phenol, tannic acid, iodine, or mercuric chloride (precipitates); amyl nitrite, ammonia alum, hydrochloric acid, ferric chloride, ferrous and ferric sulphates, cupric sulphate, or nitrous acid cause discolourations; with calomel, as a highly toxic product may result; sodium bicarbonate decomposes it with production of an odour resembling acetic ether; orthoform produces a pasty mass. In general it is best to administer antipyrin alone.—B. & C.D. ii./04,559.

Liquefactions occur on rubbing it with butyl-chloral hydrate or sodium salicylate, but solutions with the latter keep without perceptible change if dilute. Liquefaction also occurs on mixing with β-naphthol.

In sciatica the following relieves the painful symptoms:—Phenazone 6 grains, Phenacetin 3 grains, Exalgin $1\frac{1}{2}$ grains, Potassium Sulphate $1\frac{1}{2}$ grains, Dover's Powder (*sine Ipecacuanha*) 3 grains. To be given in a cachet three or four times in the 24 hours. Good effects are also obtained from the following:—Phenazone 5 grains, Phenacetin 5 grains, Opium Powder $\frac{1}{6}$ grain, in a cachet; 3 to 6 of which can be taken each day.—Pr. Mar. '11, p. 459.

Effervescent Antipyrin contains 5, 10 or 15 grains in a drachm. *Dose.*—One teaspoonful or more.

Injectio Antipyrin Hypodermica.—1 grain contained in 2 minims. *Dose.*—8 to 30 minims (**0·5 to 2 Cc.**). **Sterules, Hypodermic** contain 4 grains (**0·25 Gm.**). The pain it causes may be lessened by the addition of cocaine, as in—

Ⓟ **Injectio Antipyrin et Cocainæ Hypodermica,** containing 1 grain of Cocaine Hydrochloride in 150 minims of above. *Dose.*—8 to 30 minims (*vide* also Liquor Cocainæ et Antipyrin).

Tubache's Method of treating sciatica.

Dose.—1 Cc. injected along the course of the nerve of a Solution of Phenazone 1 drachm, Cocaine Hydrochloride 1 grain, Sterile Water 1 drachm. Some 8 to 10 injections at intervals of 3 or 4 days. Pain after each lasts 6 hours. Sometimes Morphine necessary. Recovery—B.M.J. i./13,168; L. i./13,1023.

Ⓟ **Sterules, Hypodermic** contain 4 grains Antipyrin with Cocaine Hydrochloride $\frac{1}{20}$ grain. The latter may be increased.

Tablets of Antipyrin contain 2½ and 5 grains each. *Dose.*—1 to 4 or more. Also 3 grains and **Caffeine** 1 grain.

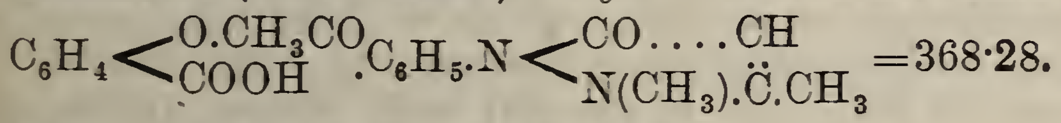
In whooping-cough, antipyrin as a sedative in gastro-intestina irritation in children, and in enuresis—small doses.—M.A. 1908,5.

Tabes dorsalis. The pains are usually controlled by Phenazone.—L. i./10,355.

Local hæmorrhage of hæmophilia well treated by application of a strong solution of Antipyrin in Ferric Chloride.—M.P.C. ii./11,377.

Pommade Reclus. Phenazone 5, Salol 3, Boric Acid 3, Iodoform 1, Phenol 1, Mercuric Chloride 0·1, Vaseline to 200. The formula is often modified—it may be diluted or made much stronger. For burns 1 or 2% Orthoform may be added.—*c. f.*, B.M.J. ii./16,708.

✱ **Acetopyrin** (T.M. 233820).—*Syn.* ANTIPYRIN ACETO-SALICYLAS.



$$C_6H_4{<}\begin{matrix}O.CH_3CO\\COOH\end{matrix}.C_6H_5.N{<}\begin{matrix}CO....CH\\N(CH_3).\ddot{C}.CH_3\end{matrix}=368{\cdot}28.$$

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

A white crystalline powder, ***soluble*** 1 in 160 water, but about 1 in 3½ of Alcohol 90%. Analgesic, antipyretic, and anti-arthritic, used in sciatica, hemicrania, influenza, etc., is without injurious heart action.

Ferropyrin. $Fe_2Cl_63(C_{11}H_{12}N_2O)=888{\cdot}953$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

TRADE MARK, none; PATENT, voided.

A *soluble* orange-coloured powder. Given for chlorosis and anæmia. It is hæmostatic and locally astringent, applied pure or 20% aqueous solution; and in gonorrhœa, injections 1%. *Incompatible* with salicylic acid.

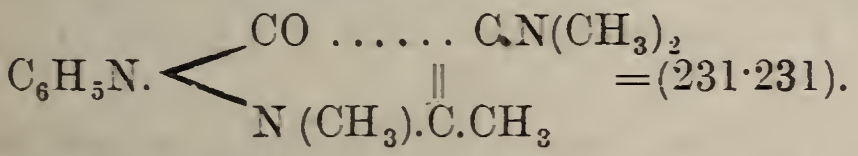
Hypnal. $C.Cl_3.CH(OH)_2C_{11}H_{12}N_2O=353{\cdot}585$. *Syn.* MONO-CHLORALANTIPYRIN.

Dose.—Up to 15 grains (**1 Gm.**), in cachet or suspended.

Manufacture.—By rubbing together Antipyrin 188 and Chloral Hydrate 165·5 until melted. Recrystallise from hot water.—Schmidt.

Soluble 1 in 10 of water. Sedative and hypnotic, specially where there is pain or cough *Incompatible* with Amyl Nitrite.

Amidopyrin. ✱**Pyramidon.** Dimethyl-Amido-Antipyrinum. **P. Jap.** *Syn.* DIMETHYL-AMINO-ANTIPYRINE. Ph. Ital., FR. CX.,

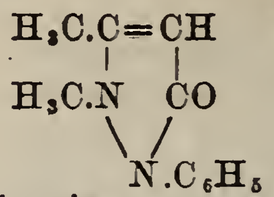


$$C_6H_5N.{<}\begin{matrix}CO\ ......\ C.N(CH_3)_2\\ \|\\ N\,(CH_3).C.CH_3\end{matrix}=(231{\cdot}231).$$

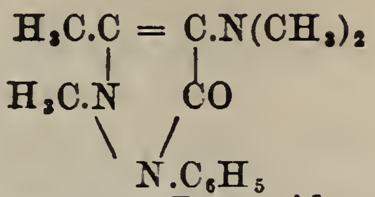
Dose.—5 to 8 grains (**0·3 to 0·5 Gm.**). FR. CX. has max. single 15 grains; max. during 24 hours 45 grains approx.

TRADE MARK: 215952/1898, renewed 1912. PATENTS: 7709/1896 and 9268/1897 (now ***expired***) U.S. Patent 579,412 (1897).

Manufacture. — The following indicates the position of the Dimethyl-Amido group :



Antipyrin.



Pyramidon.

Nitrosoantipyrin is first prepared by adding Potassium or Sodium Nitrite to a concentrated solution of Antipyrin in dilute Acetic Acid. This compound is reduced with Zinc Dust and Acetic Acid in Alcoholic solution to Amidoantipyrin. The latter compound forms yellow needles melting at 109° C. This amido body is then methylated by means of Methyl Iodide in Methyl Alcoholic solution in the presence of Caustic Potash.

Another method, probably not so expeditious, is to dissolve the Nitroso compound in Acetic Acid with the addition of Alcohol and treat with Benzaldehyde to produce crystals of Benzilidine-amido-Antipyrin. The Amido-Antipyrin is thrown out from this compound by means of Soda and is warmed with Methyl Iodide to produce Ammonium-Trimethyl-Amido-Antipyrin Iodide which in dissolving in Methyl Alcohol decomposes with formation of Amidopyrin.

A white powder M.pt. 108° C., *Soluble* about 1 in 9 of water and 1 in 2 of alcohol 90%. Incompatible with Amyl Nitrite, Apomorphine and Gum Acacia. Antipyretc. A **Camphorate** (*dose*—8 to 12 grains), **Bicamphorate** and **Neutral Camphorate.** PATENT 22,391/1900, (***became void***), (*dose*—12 to 15 grains), and SALICYLATE (PATENT 11,040 of 1900, now ***lapsed***), (*dose*—8 to 12 grains) are also prepared.

The camphorates are antipyretic, and have been advocated to suppress the sweats in phthisis, but as F.N. 1908 points out, why combine the antipyretic with camphoric acid—an active antisudorific ? The salicylate is given in rheumatic affections. ✱**Trigemin** (T.M. 256068/1903, PATENT 15,782/1903, lapsed 1909), (*Dose*—12 grains) is a butyl-chloral hydrate compound made by combining the constituents in molecular proportions (193·4 of Butyl Chloral Hydrate and 231 of Amidopyrin) on the water bath. We find this method works quite satisfactorily. After cooling recrystallise from Benzene. Is not a hypnotic ; for neuralgia, and sciatica.

For common colds for which *M. catarrhalis* is responsible, Pyramidon and its salts are useful.—L. ii./08,1661.

In sciatica Pyramidon, which has the advantage of not setting up gastric intolerance, is often useful in a dose of 6 grains in a cachet, three times a day.—Pr., Mar. '11,459.

In fibrositis 6 grain doses enhance utility of Aceto Salicylic-Acid (10 grains) in relieving pain.—A. P. Luff, B.M.J. i./13,756.

Antipyrinum Salicylicum, P. Austr., P. Belg., Fr. Cx., P. Helv., P. Jap. *Syn.*—**Salipyrin, Pyrazolonum Phenyl-dimethylicum-Salicylicum.**

$C_{11}H_{12}N_2O.C_6H_4(OH)(COOH)=326{\cdot}254$. *Dose.*—15 to 30 grains (**1 to 2 Gm.**). Max. single dose 2 Gm., *pro die* 6 Gm.

Manufacture.—This is one of the easiest "synthetics" to prepare. Obviously all that is necessary is to combine the basic and acidic components in molecular proportions. Warm on a water bath Antipyrin 188 with Salicylic Acid 138. They liquefy and on resolidifying may be recrystallised from Alcohol. It crystallises in beautiful plates.

The process in the Patent Specification 10432/1890 which was in force for 12 years states that Phenylhydrazin, Aceto-acetic Ether, Methyl Salicylic Ether, Hydriodic Acid and Methyl Alcohol have to be heated together under pressure at 160—180° C. (!)

In white crystalline powder, with sweetish taste, sparingly *soluble* in water; incompatible with acids, alkalis, and nitrites.

Useful in acute rheumatic fever, and in chronic rheumatism, and sciatica; also for influenza and any acute catarrh and for menorrhagia; as antipyretic in dose double that of antipyrine.

Tablets contain 5 grains (0·3 **Gm.**).

Thallinæ Sulphas.

$[C_9H_9(O\ CH_3)NH]_2H_2SO_4+2H_2O=460{\cdot}436$. *Dose.*—3 to 5 grains (**0·2 to 0·3 Gm.**).

In whitish crystals, melting at 212° F. *Soluble* 1 in 7 of water Is antipyretic internally. Nine grains have proved fatal. **Injection** of 1 to 2% aqueous solution is useful in gonorrhœa. **Bougies of Thalline Sulphate.** Contain 1 or 2 grains in each (gelatin), 2½ or 4 inches long. **'Collapsubes,'** with catheter attachment, of Thallin Ointment 5% with Cocaine Hydrochloride 2% are prepared for the treatment of gonorrhœa. **Antrophores**, or spiral spring bougies coated with gelatin, and medicated with 5 (or weaker 2½) % of Thalline, have been used successfully for gonorrhœa. For others, *vide* Index.

COCÆ FOLIA.

P1 "*Coca, any preparation or admixture of, containing* 1 *or more per cent. of Coca alkaloids.*

Ⓟ *Coca, any preparation or admixture of, containing more than* 0·1 *per cent., but less than* 1 *per cent. of Coca alkaloids.*"

See also Cocaine and Opium Regulation, page 949.

History of Coca. The plant originally named "Khoka" meaning "the tree of trees" first became known in Europe through the writings of Garcilaso Inca de la Vega, a student of Peruvian history, who died in 1616. Joseph de Jussieu in 1750 was the first to send specimens of the plant to Europe.—P.J. i./09,28; L. i./09,485.

Cocæ Folia (B.P. '98). *Syn.* Cuca.

Dose.—½ to 2 drachms (**2 to 8 Gm.**).

The dried leaves of Erythroxylum Coca (*Off.*) and its varieties (*Linaceæ*) Fr. Cx. Two varieties are met with, North Peruvian or Truxillo variety, *Erythroxylon Coca* var. *novo-granatense* (Morris) of a pale green colour, small and thin, and the Huanuco or Bolivian variety, *E. bolivianum* (Burck), thought to be a distinct species, which are larger, broader, and thicker, and better therapeutically; of a dull olive colour. The characteristic inner curved lines from base to apex are on this more marked.

The leaves contain the crystalline alkaloid Cocaine, *q.v.* A content of 0·5% of this base has been suggested as a standard. They are said to be most active when freshly dried, and are much used by the natives in Bolivia and Peru, miners, travellers, and others. Much of the Coca coming in now is cultivated in Ceylon. *For details of assay by the author and others vide Vol. II.*

Coca-Chewing Gum is prepared containing in each piece (weighing 45 grains) 2 grains of extract(=about $\frac{1}{25}$ grain of Coca Alkaloids).

Elixir Cocæ.—6 parts are equivalent to 1 of the leaves.

Dose.—1 to 4 drachms (**4 to 15 Cc.**) in water is a palatable preparation. Standardised to 0·075% Coca Alkaloids.

P1 Extractum Cocæ.

Dose.—2 to 15 grains (**0·12 to 1 Gm.**), in pills or pastils. A 'solid' or powdered extract. Made with alcohol 60% standardised to 2% Coca Alkaloids (1=about 4 of leaves).

Ⓟ **Extractum Cocæ Liquidum** (B.P. '98).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**). 1=1 of leaves exhausted with 60% alcohol. It therefore contains approx. 0·5% Coca alkaloids. (45 or even 30% alcohol would make it more miscible.—P.J. ii./09, 142.)

If freed from wax, it is miscible with water and more palatable

Flavoring.—Syl Vanillæ, Glyl Coriandri; Elixir Saccharin.

Ⓟ **Fluidextractum Cocæ, U.S.** *Dose.*—30 minims. Standard 0·5 Gm. ether-soluble alkaloids in 100 Cc.

Infusum Cocæ.—1 in 50 of boiling water

Is a refreshing beverage with a slice of lemon.

Ⓟ **Pastillus Cocæ Extracti.**—$2\frac{1}{2}$ grains (**0·15 Gm.**) of the extract in each. *Dose.*—One every two or three hours.

For loss of voice due to weakness or relaxation of the vocal cords.

Ⓟ **Vinum Cocæ.**—1 of leaves in 8 of Sherry.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ ounce (**8 to 15 Cc.**) diluted with wine or water. Checks vomiting of irritable stomach.

This is strongly *medicated*; *it must contain half a grain* of alkaloid in the ounce, or it cannot be sold without a licence. Weaker preparations, containing about 1 in 20 or 30 of a sweet red wine, are sold by wine merchants. We understand that one well-known brand is made 1 in 16 and calculating on leaves as of 0·5% strength, this would mean $\frac{1}{8}$ grain Cocaine in 1 ounce.

Uses of Coca.—Coca has been praised as a nervine and muscular tonic, preventing waste of tissue, appeasing hunger and thirst, relieving fatigue, aiding free respiration, and as being useful in various diseases of the digestive and respiratory organs; it is recommended for indigestion, gastralgia, gastrodynia, nausea, sickness, distaste for food, is given to relieve pain, nausea, vomiting or discomfort caused by excess in either eating or drinking or by pregnancy, and as a cure for morphine and alcohol craving. In using it for the latter in America it is said in some cases to have produced 'Coca Craving.' The leaves are sometimes smoked to relieve asthma; and used generally for the stimulant and narcotic effect of tobacco and alcohol.

P1 Cocaina (*Off.*). *Syn.* METHYL-BENZOYL-ECGONINE.
$C_9H_{13}(CH_3)\ (C_6H_5CO)NO_3 = 303{\cdot}258$.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**), in a pill or tablet.

This important alkaloid, obtained from Coca, was first isolated by Niemann in 1860. It crystallises in shining monoclinic prisms, and is almost insoluble in water.

CONSTITUTION OF COCAINE *is dealt with in Vol. II.*

Cocaine in Liquid Extracts gradually undergoes hydrolysis and the accompanying alkaloids do so more rapidly than the Cocaine. Jowett argues against the galenical preparations of Coca. Amongst the accompanying alkaloids γ-isatropyl-cocaine (*syn.* *a*-truxilline or Cocamine) is a powerful heart poison which may be present in varying amount. This is stringently excluded from the alkaloid Cocaine and its salts.—P.J. i./13,364.

Extraction of (Crude) Cocaine is in the following stages :—

Treatment with (1) Sulphuric Acid 0·5%, (2) the liquor is rendered alkaline with Sodium Carbonate, avoiding excess, (3) stirring with Petroleum for 3 or 4 hours, (4) Extraction of the solvent with Acid 0·3%, then this with required amount of alkali Collect and wash. The pasty mass contains 87 to 93% pure Cocaine.—O. Sperber, Tropenpflanzer, 1911,15,684—687, per J.S.C.I.

Soluble 1 in 10 of 90% alcohol, about 1 in 100 to 150 of liquid or soft paraffin ; 10 to 20% of olive oil will assist solubility, freely so in chloroform (**2 in 1**), ether (about 1 in 4), oil of cloves, and many other volatile oils, and 1 in 10 of castor, and other fixed oils, 1 in 2 of anhydrous lanolin (warmed) ; 1 in 80 of petroleum spirit. Almost insoluble in water. Insoluble in glycerin.

Suppositories, bougies, buginaria and pessaries are sometimes ordered to be made with Cocaine (base) as it is soluble in fats and oils ; in our opinion the hydrochloride is better. The same applies to all alkaloids,—soluble salts should be employed for these purposes.

Cocaine Habit.—Since suppression of the Opium Traffic the Chinese are finding consolation in Cocaine. This is far more serious. In five or six months a man may become a mental degenerate. An important sign was detected—epistaxis and ulceration of the nasal mucous membrane. It is taken by snuffling of Cocaine contained in Catarrh Snuffs. The epistaxis is accounted for by the severe congestion produced by the Cocaine upon the Schneiderian membrane and the increased blood pressure incident to its use.—L. ii./10,1317.

Cocaine smuggling into India still proceeds to a great extent. Its use is a growing evil among Indians of all classes. The International Opium Convention (to control Opium and allied Drugs) awaiting ratification.—B.M.J. ii./13,1102.

Abuse in U.S.A. Remarkable figures as to Cocaine (150,000 ozs. illegitimately used per annum), Chloral and Opium.—L. i./13,768.

Cocaine snuffing amongst the underworld of Montmartre has occasioned some alarm amongst the French Medical Authorities. Symptoms described—disturbed general sensibility, hallucinations, etc. Cocaine craving can be established in a day or two. Under French law a pharmacist who sells Cocaine without a prescription and without registering the name of the purchaser may be prosecuted. One was sent to prison for a fortnight and fined several thousand francs.—B.M.J. i./13,358.

International Control of Drugs of Addiction.—Sir W. J. Collins, B.M.J. ii./19,369.

See also paragraph under ***Abuse of Opium.***—*British Govt. and Peace Conference also* ***Cocaine and Opium Regulation,*** p. 949.

"Billie Carlton" Case. Death from overdose of Cocaine self-administered—unlawfully supplied to her by De Veulle in a culpable negligent manner. Other cases of sale contrary to regulations—C.D. Feb 1/19, p. 93, 245.

Cocaine Poisoning.—Methods of examination of stomach washings, urine, etc. Limits of fatal doses. 3½ grains injected into the breast of a woman caused death in 20 minutes.—Useful summary to be consulted if required.—B.M.J. i./13,16

Antidotes.—Toxic effects are best counteracted by amyl nitrite, nitro-glycerin, digitalis, strychnine, or ammonia, with strong coffee by mouth or enema, and ether hypodermically (5 minims). Anæsthesia by chloroform and ether may be required to prevent respiratory spasms.

P1 **Bougies of Cocaine** ½ grain (**0·03 Gm.**) or more, with cacao butter. Useful in urethral affections.

P1 **Cocaine-Lanolin**—*Martindale*, containing 10% Cocaine Hydrochloride, is a special preparation useful for dental cavities containing hyper-sensitive dentine prior to filling. A small amount to be carefully sealed in the cavity and left for two or three days.

It is found to act "like a charm" on sensitive erosion cavities.

P1 **Cocaine - Menthol - Phenol.**—Equal parts liquefy and form a paste for inserting into tooth cavities; stops the pain promptly.

P1 '**Cocaine-Menthol-Eugenol**'—Cocaine, Menthol, Eugenol and Alcohol 90% equal parts. Applied on a pledget of cotton wool, followed by jets of cold air, *e.g.*, from a chip syringe, relieves toothache rapidly.

P1 Camphor 5, Chloral 5, Cocaine Hydrochloride 1, warmed, form an oily liquid which cures toothache.

P1 **Cocaine in Clove Oil**, 5%. Relieves toothache and earache.

P1 **Collodium Cocainæ**, 2% in flexible collodion. Allays itching, and is a cure for inflamed chilblains.

P1 **Emplastrum Cocainæ.**—1 dissolved in 50 of melted lead plaster. Useful for intercostal neuralgia, sciatica, tender corns, bruises, &c.

P1 **Nebula Cocainæ Oleosa.**

Cocaine Base 1, Oleic Acid 4, Liquid Paraffin to 20. May be made stronger, but this 5% strength should prove sufficient in most instances. Furthermore 12 grains of the base will dissolve in 1 ounce of almond oil.

In cauterising laryngeal growths a solution of the base in olive oil to anæsthetise the tracheal mucous membrane is useful; it allays the irritating cough so troublesome in these operations.—L. ii./07,1452.

P1 **Oleum cum Cocaina.**

A 2% solution, more or less, if ordered, in almond oil, is mostly used. This is useful for earache. For the eye a 2% solution in **Castor Oil** is used, may be combined with Homatropine;—for catheters, a solution in equal parts castor and almond oils is useful, it is viscid.

Ⓟ **Cocaine Eye Drops, Factory Act, Solution No. 1.** (For conditions of sale *vide Cocaine and Opium Regulation*). For a foreign body in the eye.

Dissolve powdered Cocaine (base) 0·5 Gm. in Castor Oil 95 Gm. on a water bath. While still warm add 1 Cc. of a solution containing 0·33 Gm. Mercuric Chloride in 10 Cc. of Absolute Alcohol. Mix by rotating. Apply with a camel hair brush.—Issued by the Factory Dept. of the Home Office, 1917.

P1 **Unguentum Cocainæ** (*Off.*).—Cocaine 4%. Useful where absorption is required, as in facial neuralgia, shingles, eczema, erysipelas, urticaria, and pruritus (R.O.H. has Cocaine 1, to Soft Paraffin 50; heat to dissolve and stir till cold).

P1 **Vaselinum Cocainæ.** Is made with Cocaine (base), 1, 2, 4, and 10%. The 1 or 2% are suitable for eye work, and the 4 and stronger percentages are useful for catheterisation, burns, and for intense sensitiveness of parts, pruritus, &c.

P1 **Cocainæ Citras.**
$[C_{17}H_{21}NO_4]_2C_3H_4OH.(COOH)_3=798{\cdot}62$.
Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).
In deliquescent white crystals; used by dentists.

P1 **Cocainæ Formas.**
$C_{17}H_{21}NO_4.H.COOH=349{\cdot}284$.
Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).
Prepared by combining Cocaine 303 with 46 of pure Formic Acid.

Crystalline needles, ***soluble*** about 1 in 40 of water, and about 1 in 2 of alcohol 90%. Slightly soluble in chloroform and ether, Insoluble in olive oil or in vaseline.

P1 **Cocainæ Hydrochloridum.** In numerous Pharmacopœias. $C_{17}H_{21}NO_4HCl=339{\cdot}731$. To be anhydrous.—F.I.

Usual Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**), but more may be given, in solution, pill or pastil. (*Off*) $\frac{1}{10}$ to $\frac{1}{4}$ grain.

Fr. Cx. has *maximum single dose*, $\frac{3}{4}$ grain; maximum during 24 hours, $2\frac{1}{4}$ grains approx.

Shining, lamellar crystals, with bitterish taste. One part of Cocaine base=1·12 of the Hydrochloride.

Soluble 2 in 1 of water, also in alcohol and in glycerin, insoluble in ether, fats, and oils. It will crystallise with 9·5% of water of crystallisation, but the anhydrous salt is preferred. M. pt. 183° C.

Glycerin of Starch is a useful solvent. A solution in this can be applied locally without lint or wool. Keeps well and is economical. —J. T. Hall, B.M.J. i./17,765. L. i./17,824.

Incompatible with ammonium carbonate (soluble in excess), carbolic acid, mercuric and mercurous chlorides. It is also precipitated by borax.*

Cocaine in Dental Extractions.

Ⓟ **Dental Anæsthetic**—*Martindale*, is used as a local anæsthetic for extraction. It contains slightly less than 1% of Cocaine Hydrochloride and Iodine in the requisite chemical combination,

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* When borax and cocaine hydrochloride are prescribed together a weight of Boric Acid equal to that of the borax should be ordered at the same time to prevent precipitation.—Y.B.P. 1903,270.

In dispensing White Precipitate with cocaine hydrochloride in the form of an ointment, dissolve the cocaine salt in a drop or two of water. Rub the white precipitate down with a little almond oil, mix, and add the remainder of the ointment base—*e.g.*, soft paraffin.—Y.B.P. 1903,271;

together with hæmostatics. It is believed to be harmless in action.

Dose.—The amount used varies with the number of teeth to be removed. In view of the fact that $\frac{1}{2}$ grain of Cocaine should not be exceeded, 50 minims may be considered a maximum. The usual dose may be put at 10 to 25 minims. As much as 120 minims have been employed by dentists without evil effect, but this quantity is not recommended by us.

(As much as 20 minims of a 10% solution,—10 minims either side of the tooth at 5 minutes interval = 2 grains of Cocaine Hydrochloride has been recommended, but this must be considered excessive).

The injection is made alongside the teeth to be extracted. Some transitory swelling of the gums may be expected after all local anæsthetics.

One may bear in mind that the British Pharmacopœia gives $\frac{1}{5}$ to $\frac{1}{2}$ grain approx. as an ordinary hypodermic dose (in the Hypodermic Injection of Cocaine).

The Dental Anæsthetic contains nothing of the nature of Adrenalin, but a small dose of the 1 in 1,000 solution *may be added at the time of use if excessive hæmorrhage be feared,* or it may be injected afterwards in severe operations to arrest primary or secondary hæmorrhage. See also Hæmorrhage, Dental. Therap. Index.

As result of legislature then contemplated, a user of this preparation wrote: "*After having extracted hundreds of thousands of teeth with your anæsthetic without even one unsatisfactory operation,* it grieves me to think that after this month I am to experiment on patients with a German product." (P.G. Oct. 16,1916.)

Some operators make a practice of spraying the cavity after removal of the tooth, with a little 20 volume **Hydrogen Peroxide.**

The following injections are recommended by a distinguished Dental Surgeon:—

Cocaine Hydrochloride 3 grains, Solution of Adrenine (1 in 1,000) 1 drachm, Solution of Hamamelis 7 drachms; also Eucaine 6 grains, Phenol 5 grains, Solution of Hamamelis 1 ounce.—P.J. ii./09,96, No doses stated. 20 minims of the former contain $\frac{1}{8}$ grain Cocaine Hydrochloride.

A Bill *before a Departmental Committee at the Home Office, making the administration of either general or local (injected) anæsthetics by other than registered medical men or persons under their immediate supervision, or by a registered dentist in the course of dental surgery, or by a bona fide student acting under his supervision, a punishable offence. Enquiries in* 48 *provincial towns with an aggregate population of* 2,138,100 *showed* 480 *available registered dentists, or a ratio of* 1 *to every* 4,454·4 *persons.*—B.M.J. ii./09,1283; L. ii./09,1266.

The question of the use of Cocaine and the danger of accidents from its use by unqualified dentists was considered by the Committee on Deaths from Anæsthetics in 1910, who reported that legislative interference was undesirable.—C.D. i./13,496.

See also **Departmental Committee's Reports** to the Home Office, Nov. 1916, on use of Cocaine in Dentistry by unlicensed dental practitioners; also **Dentists' Act Committee,** 1919.

Notes on Tooth Extraction.—Place the fingers in the sulcus between cheek and gum, and stretch the cheek away from the gum sufficiently to render the mucous membrane taut at its attachment or reflection: It is thin and firm enough under moderate traction to be punctured easily, choosing a spot opposite the point of operation at about ⅛ in. from the jaw, the parts are loose enough to allow 10 or 20 minims to be injected without its escaping after removing the needle. The gum should not be punctured as it is too adherent to the bone, and fluids diffuse in it with difficulty ; and with many punctures there is increased risk of sloughing, besides being too painful to some. Complete local anæsthesia is obtained by puncturing thus, and using ⅓ grain of Cocaine Hydrochloride in 10 minims of lukewarm boiled water. An ordinary needle preferred to the dental short one, as the hand blocks the view.—Percy Furnivall, British Journal of Dental Science.

A 1% solution should be used, 15 to 20 minims of which gives the best results. Congestion always follows the use of Cocaine, and in most preparations Adrenalin (which is also vaso-constrictor) is added to prolong the insensibility and localise the anæsthetic. The injection should be made slowly and as few pricks with the needle as possible. Never push the needle too deep, for injury of the periosteum of the bone with the needle point may be one source of trouble. Rapid injection must be avoided, and never inject into any but healthy tissue. If the gum is septic, cleanse round the tooth to be extracted with some antiseptic on cotton-wool. Use a thoroughly sterilised syringe in good working order In injecting there should be resistance to the pressure on the piston. Reinsert the needle if resistance is not met with. If the fluid goes into the gum too easily, it may be due to passage into loose cellular tissue, and this sometimes causes after-swelling. There should be little danger of cellulitis, sloughing, or necrosis if the above instructions are followed out. Employ an antiseptic mouth-wash, an astringent may be necessary.—C.D. ii./09,734.

P1 **Calorific Fluid** for dental use.

Cocaine Hydrochloride 1, Camphor 10, Clove Oil 4, Ether 25, Chloroform 30, Absolute Alcohol 30.

P1 **Aurinaria Cocainæ Hydrochloridi.** — EAR CONES, contain ⅒ grain in each with gelatin.

P1 **Guttæ Cocainæ Hydrochloridi, R.O.H.,** 2 or 5%. G.N.C. has Cocaine Hydrochloride 9 grains, Chlorbutol 1 grain. Water to 1 ounce.

P1 **Guttæ Cocainæ Cum Adrenina.**

Cocaine Hydrochloride 5 grains, Adrenin Solution 1 in 1,000, to 100 minims.

P1 ***Injectio Cocainæ Hypodermica** (*Off.*)†

Cocaine Hydrochloride 1 in 20 in dilute Salicylic Acid solution (0·15%).

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**).

FR. CX. 1% directed to be heated in the bottle surrounded by boiling water for ¼ hour, or in a sterilser at 110° C. for 10 minutes.

A solution up to the strength of 50% may be prepared in salicylic acid solution 0·15% strength, which is nearly saturated.

The B.P '98 injection was *hypertonic*. Should be *hypotonic* as it would then mix more readily with the lymph, and be carried off more quickly by the lymph circulation. A solution 0·594 Gm. in 10 Cc. is isotonic.—P.J. i./12,357.

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* As the Act is worded at present it could be contended that preparations of **Cocaine** in any strength are Ⓟ.

† **Hypodermic Syringes** are—1. Metal or vulcanite mounted (capacity 15 or 20 minims), with glass barrels. 2. "All glass." 3. All metal, graduated in 20 minims. 4. Antitoxin capable of thorough sterilisation, capacity 3, 5 and 10 cubic centimetres, in plated metal cases. The tightness of the piston is adjustable. '**Vaccine Syringes.**'—1 Cc. in ⅒, "All glass" with needle of rather wide lumen (No. 2) The name "**Pravaz**" is given to Syringes of, as a rule 1 Cc. capacity A Pravaz-Syringe does not otherwise deviate from the hypodermic syringes generally in use.—B M.J ii./08,779.

The question is frequently asked—***Can Cocaine Hydrochloride Solutions be sterilised by boiling, with impunity?*** In general the reply is that boiling sufficient to sterilise is not injurious. *We deal further with the matter in Vol. II.*

Intravenous use of Cocaine Hydrochloride—Enormous dose necessary for anæsthesia; not suitable for man. 5 grains in a 2% solution was injected into the vein of the hand—dizziness and palpitation set in. Anæsthesia even then was not perfect.—P.J. i./11,206.

P1 **Isotonic Cocaine Eye Lotion.**

Cocaine Hydrochloride 1, Sodium Chloride 1·25, Distilled Water to 100. This is isotonic with the tears with which 1·4% Sodium Chloride solution is isotonic.—Pres.

P1 **Hypodermic Tablets** are prepared with $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, and $\frac{1}{2}$ grain of Cocaine hydrochloride in each.

P1 **Lamellæ Cocainæ, Discs of Cocaine** (*Off.*); **R.O.H.**

Discs of gelatin, each containing $\frac{1}{50}$ grain of Cocaine Hydrochloride are for ophthalmic use. These should be prepared in an atmosphere carefully rendered aseptic. Also prepared P1 containing $\frac{1}{20}$, $\frac{1}{100}$ and $\frac{1}{200}$ grain in each, and in combination with P1 Atropine Sulphate (*q.v.*) P1 Homatropine (*q.v.*) and P1 Physostigmine (*q.v.*)

P1 **Liquor Cocainæ et Antipyrin.**—Cccaine Hydrochloride 5, Antipyrin 5, Phenol 1, Water to 100. Used for painting the interior of the larynx during the operation of thyrotomy, and applied to the nostrils on cotton wool for small operations, *e.g.*, with the cautery.—C. Nourse. Also found useful for general anæsthetic purposes.

Ⓟ **Pastillus Cocainæ Hydrochloridi.** $\frac{1}{10}$ grain (**0·006 Gm.**) in each (or more if ordered). Useful in allaying throat irritation and hoarseness. Also made Ⓟ $\frac{1}{15}$ grain with **Morphine** $\frac{1}{30}$ grain.

Ⓟ **Pastils of Cocaine,** $\frac{1}{50}$ grain, **with Antipyrin** 3 grains, are prepared. They are useful in the treatment of asthmatic affections.

P1 **Pilula Cocainæ Hydrochloridi.** $\frac{1}{5}$ grain (**0·012 Gm.**) in each (or more, if ordered), with milk sugar.

P1 **Nebula Cocainæ Hydrochloridi.***—May be prepared 1, 5 or 10%, or more if ordered with sterile 'Normal Saline' for general use.

P1 **'Solubes' Cocaine Hydrochloride** contain 1 and 5 grains for lotions, also $1\frac{1}{8}$ and $2\frac{1}{4}$ grains. Those weighing $1\frac{1}{8}$ grain produce a 1% solution on dissolving in 2 drachms of water, and those weighing $2\frac{1}{4}$ grains with 1 drachm of water produce 4% solution.

P1 **Injectio Cocainæ et Nitroglycerini.**

Dose.—Up to 15 minims (**1 Cc**) = ($\frac{1}{2}$ grain Cocaine Hydrochloride).

Cocaine Hydrochloride 5 grains, Nitroglycerin Solution (1%) 10 minims, Distilled Water to 150 minims.—F.N., 1909 (Modified).

Nitroglycerin in this way is valuable in counteracting any evil effects of cocaine.

P1 **'Sterules,' Ophthalmic** are prepared containing Cocaine Hydrochloride Solution 10 grains to the ounce (2·3%).

For general purposes P1 **Large 'Sterules'** (Tube form) are prepared containing 10 minims of Cocaine Hydrochloride Solution 5% and 10% strength, *vide* also Index for **Sterules, Hypodermic.**

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* **Sprays** for Cocaine Solutions should have fine aperture for the jet.

P1 **Hypodermic 'Sterules' of Cocaine Hydrochloride** $\frac{1}{3}$ grain, with **Adrenalin** $\frac{1}{1000}$ grain are prepared for painless dental extraction.—(*c.f.* Adrenalin).

P1 **Suppositories** and **Pessaries** $\frac{1}{2}$ grain (**0·03 Gm.**), or more. **C.H.W.** has Suppositorium Cocainæ Vaginale, 2 grains Cocaine Hydrochloride in 2 drachms Theobroma basis. S.H. has Pessus 1 grain in 2 drachms.

Experience of use of Cocaine in labour (33 cases), Suppositories ($\frac{1}{2}$ grain) tampons soaked in 10% solution useful in various cases, but with exception of 7 cases there was a varying amount of post-partum hæmorrhage difficult to control. This increased tendency to hæmorrhage attributed to the Cocaine.—B.M.J. ii./90,356.

Poisoning by Cocaine Hydrochloride 3 grains injected into the urethra in retention of urine—B.M.J. ii./06,868.

A 10% solution on wool to rigid os uteri in first stage of labour produces rapid dilatation.—B.M.J. ii./98,1374.

P1 **Compound Cocaine Suppository** of Cocaine $\frac{1}{6}$ grain with Morphine $\frac{1}{2}$ grain (Hydrochlorides) is useful for painful hæmorrhoids.

P1 **Tabellæ Cocainæ,** Cocaine Tablets, $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, and $\frac{1}{20}$ grain with chocolate. The usual dose is $\frac{1}{20}$ grain.

Dose.—1 every quarter, half-hour or hour, quickly eaten and swallowed. Useful for sea-sickness (chloroform or alcoholic sickness) and that of pregnancy.

Sea-sickness may be overcome by internal use of the following:—Cocaine Hydrochloride 0·2 Gm. Iodine Tincture 2 Cc.. Water to 150 Cc.—*Dose*, 1 tablespoonful 2 to 4 times daily. More palatable without the Iodine.

ⓟ **Syrupus Cocainæ.** Hypodermic injection of Cocaine Hydrochloride (*Off.*) 44 minims, Syrup of Orange Flower to 1 ounce. *Dose.*—1 drachm = $\frac{1}{4}$ grain.

ⓟ **Trochisci Cocainæ Hydrochloridi.** $\frac{1}{12}$ grain (**0·005 Gm.**) in each. **T.H.** has $\frac{1}{10}$ grain.

P1 **Cocaine Hydrobromide** also P1 **Hydriodide,** P1 **Sulphate** (deliquescent), and P1 **Lactate** (white amorphous mass) are sometimes used instead of the Hydrochloride with the same dose.

P1 **Cocaine Periodide (Di-iodo-Cocaine Hydriodide).**

$C_{17}H_{21}NO_4.HI+I_2=685·025$. *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ grain.

Violet or almost black crystals. Has been tried for vomiting in pregnancy.

P1 **Cocainæ Nitras, Cocaine Nitrate.**

$C_{17}H_{21}NO_4.HNO_3=366·281$.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**)

In large colourless crystals, readily ***soluble*** in water. Is compatible with silver nitrate, and if used previously in solution lessens the pain caused by the latter salt.

P1 **Cocaine Nitrite** is also prepared for use in an anti-asthmatic spray (*vide Tucker's Asthma Cure, Vol. II.*).

P1 **Cocainæ Phenas.** *Syn.* **Cocaine Carbolate.**

Dose.—In pill, $\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**)

A slightly soluble pasty compound, used by dentists and given for gastralgia.

Strongly antiseptic and may be used on cut surfaces, as its coagulating effect on albumen prevents too rapid action.

P1 Cocainæ Salicylas, $C_{17}H_{21}NO_4.C_6H_4.OH.COOH=441·346$.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0.03 Gm.**). Is in minute snow-white crystals, very deliquescent; it forms a solution which keeps well. ***Soluble*** 5 in 1 of water, $2\frac{1}{2}$ in 1 of alcohol 90%. In spasmodic asthma, the hypodermic injection of a full dose at the beginning relieves the attack.

Uses of Cocaine and its Salts.

Besides rendering the superficial structures of the eye anæsthetic, Cocaine is a mydriatic, and paralyses the accommodation. When applied to a mucous membrane it blanches the part, and simultaneously anæsthesia occurs. The application of an ointment of the pure alkaloid, made with lard, to a surface will remove the pain of eczema, erysipelas, facial neuralgia or shingles, and the irritation of urticaria or pruritus. Burns and scalds should first be brushed over with a 4% aqueous solution of the hydrochloride, and the pure alkaloid combined with Carron oil (Linimentum Calcis), petroleum cerate, or boric acid ointment, afterwards applied on cotton wool or lint. For fissured nipples, or stings and bites of insects an aqueous solution may be applied. The irritability of inflamed mucous surfaces, as in hay-fever, influenza, coryza, bronchitis, spasmodic asthma, laryngitis, and pharyngitis, is much relieved by the spray of a watery solution of a cocaine salt. Spasmodic and painful affections of the vagina, causing dyspareunia and vaginismus, may be minimised by vaginal injections of a quarter of a grain of cocaine in 1 per cent. oily solutions. In dentistry, it is useful in toothache. The pure alkaloid, being only slightly soluble in water, is less liable to be washed away by the saliva. If a little be inserted in the cavity of a carious tooth and covered with a plug of wool soaked in chloroform of mastiche all pain is obtunded for a considerable time. A strong solution in oil of cloves is also useful. In extraction the **Dental Anæsthetic** will be found effectual. A strong aqueous solution of the hydrochloride may be painted on the surrounding gum as an alternative or supplement.

Solutions of cocaine hydrochloride have been employed topically in excision of the tonsils, cauterizing the turbinated tissue of the nose, painting chancres previous to the application of nitric acid or other caustics, opening abscesses, removing polypi, and many cases of iridectomy and operation for cataract, squint, and the removal of foreign bodies from the eye. For the eye sterile aqueous solutions of the hydrochloride of cocaine of mostly 2, or up to 4% are used, and for other purposes from 4 to 20 or even 50%; of the weaker solutions it is necessary to repeat the application three to five times at intervals of three to five minutes.* Normal saline solution may be

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* The *nose* may be plugged with strips of gauze soaked in 20% Cocaine Solution, to which a few drops of 1 in 1,000 Adrenalin have been added. In the *urethra* not exceeding 1% should be used, as absorption is rapid. In the eye 1 to 4%. There is no drug to equal Cocaine in potency as a local anæsthetic —H. S. Souttar, B.M.J. ii./13,70.

When using Cocaine in nose operations patients should be warned to get used as a vehicle for the ophthalmic solution with advantage. No operation should be commenced within at least ten minutes of the first application. Injurious effects, either local or constitutional, rarely follow its use.

Cocaine is a stomachic, useful after excess either in eating or drinking, in distaste for food, in sea-sickness and vomiting of pregnancy, or from other causes—the **Tabellæ** *antea* are suitable.

Rectal and prostatic pains are relieved by ½-grain suppositories A rectal injection checks diarrhœa and dysentery.

Cocaine is regarded as a general protoplasmic poison. It stops the movement of spermatozoa and white corpuscles. Has a special affinity for nervous tissue.

Whooping Cough often well treated by Cocaine by the mouth, *dose* being on the basis of 1 grain *ter die* for an adult.—L. i./09,35.

Also of value by painting the external auditory meatus and membrana tympani with a pigment. **P1 Pigmentum Cocainæ et Hydrargyri Perchloridi.** Cocaine Hydrochloride 28 grains, solution of Mercuric Chloride 20 drops, Glycerin 4 drachms, Water 4 drachms, after syringing ears twice or thrice daily with Boric Acid lotion.—L. i./09,35.

Sufferers from cancer tolerate large doses of Cocaine It is questioned whether there is some natural affinity between the two. If diagnosis doubtful, and on administration of Cocaine no improvement, would consider growth not malignant. It may be viewed as a diagnostic agent. In cases cited Cocaine was given internally and externally.—B M.J. i./09,274.

For hay fever, Herbert Tilley warns against its use—may quickly generate Cocaine craving.

Blue atrophy of the skin following Cocaine and Morphine injections. Patient had been administering the drugs to herself for seven years.—L. i./12,442.

In eye work as a local anæsthetic Cocaine has not been replaced —L i./13, 688 ; Pres. June, 1913,197.

For excision of an ingrowing toenail, which he performed radically himself, a medical man injected 4 grains of Cocaine in two hours. Satisfied with Cocaine. It was found that a small initial dose may produce faintness Lay patient down to recover, then proceed with ordinary dose The first faintness is common.—H. B. Blackburn.

Cocaine 5 Gm. instead of 0·5 Gm. injected into a horse's fetlock. Operation performed. Sweating after about three hours but no violent Cocaine poisoning. Subsequent recovery.—P.J. i./15,109.

Snake bite well treated by large dose——*vide* Snake Bite—Therap. Index.

Local Infiltration Anæsthesia is produced by solutions of cocaine (and eucaine, *q.v.*) used by subcutaneous injections made along the lines of proposed incisions, and then into deeper parts before cutting them, and into the sheaths of nerve trunks to annul sensation in parts of limbs, &c. Its action commences in three minutes, increases for ten to twenty minutes, and mostly disappears within half an hour. The anæsthesia may be prolonged by applying a triangular bandage when possible above the site of injection ; this has also the advantage of lessening the risk of toxic symptoms, as the delay of cocaine (and eucaine) in the tissues renders it innocuous, either by fixing it there or destroying it locally. **Cocaine and Adrenalin** have been used together—the addition of the Adrenalin (*q.v.*) arresting the bleeding. (**Sterules** of the two combined are prepared.)

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a full meal before the operation. If this be done, Cocaine is safer than Chloroform or Ether.—B.M.J. ii./13,737.

For small operations, *e.g.*, finger amputation, Cocaine Solution 5%, to which 5 m. of Carbolic Acid and 5 m. of Suprarenalin Solution 1—1,000 have been added to each ounce of the solution, never exceeding 90 m. often less of this. Use a Cresylic Disinfectant to cleanse, and then paint over the affected parts with a 1% solution of Iodine made with Alcohol 90%.—Pr. Mar. 1912.

For infiltration a 0·01% solution of Cocaine with 3 to 5 drops of Adrenalin solution 1 in 1,000 to each 100 Cc. is sufficient.

The use of Cocaine and Adrenalin has been advocated for anæsthetising the urethra by swabbing with a plug of cotton wool soaked with 1 Cc. of a 1% solution of Cocaine Hydrochloride to which 3 drops of a 1 in 1,000 solution of Adrenalin have been added.

Cocaine Hydrochloride Solution, 0·5 or 0·25%, with the addition of 3 minims of fresh Adrenalin Chloride Solution (1 in 1,000) to 100 Cc. of Cocaine Solution. This may be kept in sterile coloured bottles, each holding 10 Cc., the glass stopper being sealed with wax—freshly opened bottles to be used for each operation. Description of operations:—Skin grafting, excision of small tumours, circumcision, abscesses, whitlows, etc., empyema (specially good results), operations on fingers and toes, also fistula in ano have done well under Cocaine anæsthesia. The Adrenalin acts by contracting peripheral vessels, so producing pallor which indicates exact area of anæsthesia. It delays absorption of Cocaine, thus prolonging the duration of anæsthesia. It acts as a hæmostatic for capillary, small arterial and venous hæmorrhage.—Pr. 1911, p. 249.

In gynæcological work Cocaine Hydrochloride as **dusting powder**—on cotton wool swabs has been used with good results. Is found to be better than Solution.

Lumbar Puncture Anæsthesia.—Anæsthesia for major operations is produced by intraspinal injections of a ½% solution sometimes with a trace of morphine added; general effects not manifest but local below puncture very marked. Subarachnoid injection produces uterine contraction, and may induce labour.—L. i./01, 645. It has been followed by a higher death rate than administration of either Chloroform or Ether.—M.A. 1903.

Bier of Bonn in 1898 first injected Cocaine in this manner into an assistant, and afterwards had the operation performed on himself.

Operations performed always low down, *i.e.*, below the level of the umbilicus, anæsthesia extending upwards, as a general rule, to within two fingers breadth below the mammæ, but three cases of mammary cancer have been removed by the method, and one resection of the elbow for tuberculosis in a patient, *æt.* 18—the doses being ½ grain (**0·03 Gm.**) in the first three, and 2/3 grain (**0·04 Gm.**) in the last case. To ensure diffusion Trendelenburg's position was maintained for ten minutes after injection, but anæsthesia was not complete. In some hundreds of cases during seven years not a single case of bad ultimate effects of Cocaine on the nerve centres. Tuffier's method is safe from ten years up to extreme age. Stovaine was also employed with, on the whole, greater advantage. The latter, however, causes urine retention.—L. ii./08,1214; *vide* also Stovaine.

Spinal Cocainization.—Interesting historical account.—B.M.J. i./13,1305.

Cocaine Ionisation, *see* Iontophoresis.

P1 **Tropacocaine.** *Syn.* BENZOYL-PSEUDO-TROPINE.

Obtained from Java Coca. The **Hydrochloride** $C_8H_{14}NO.C_6H_5$

CO.HCl=281·705 is freely ***soluble*** in water, has M. pt. 271° C., and is a powerful anæsthetic; aqueous solutions keep well; in the eye causes neither ischæmia nor irritation of hyperæmia. 3% solution recommended; anæsthesia quicker than with Cocaine, but more transitory; the action may be kept up by adding a drop from time to time. Mydriasis occurs occasionally but is slight. Injection into gums in large doses only affected pulse for 10 minutes and did not affect respiration. Solutions can be boiled with impunity.

Like Cocaine, it appears to contract dilated blood vessels. Three drops of 5% solution are sufficient for anæsthetising the eye for ordinary purposes, *e.g.* removing foreign body.—B.M.J. i./o9,640

Sciatica (severe). Tropacocaine 1 Cc. of 5% solution injected into the dural sac in the lumbar region—the nerve exposed by incision and forcibly stretched with the finger. Complete cure and not the slightest recurrence of pain.—B.M.J. i./o8,23.

Ⓟ **Tablets (Hypodermic)** contain $\frac{1}{30}$ grain.

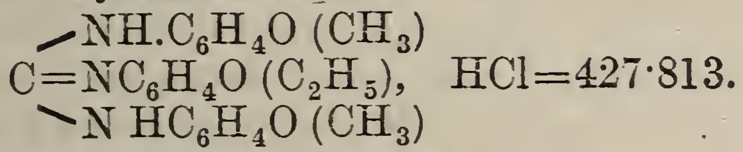
Intraspinal Anæsthesia by Tropacocaine.

Five to 8% solutions in 1 Cc. dose are employed for intraspinal injection prior to operating in hernia, fistula, hæmorrhoids and amputations.

Injections (2%) whilst patient in a stooping position, but placed in Trendelenburg's position immediately after. In operations on the pelvis and lower extremities dose 1 grain (**0·06 Gm.**); above that region 2 grains (**0·12 Gm.**); no undesirable symptoms.—L. i./o9,1349.

Ampoules containing 1·5 Cc. (25 minims) of 5% Neutral Solution in Normal Saline—Sp. Gr. 1·016—employed, *i.e.*, 20 minims of this solution is suitable for a healthy person weighing about 11 stone. *Maximum dose* 24 minims. For a child 1 year old 4 minims is enough. After a lapse of 40 to 50 minutes a second injection of 8 to 12 minims is given if required. 1,295 cases treated with this method at Queen's Hospital, Birmingham.—J. T. J. Morrison, B.M.J. i./13,1306.

✱Acoine. *Syn.* **Guanicaine, Di-para-anisyl-mono-phenethyl-guanidine Hydrochloride.**



$$C\begin{cases}NH.C_6H_4O\,(CH_3)\\ =NC_6H_4O\,(C_2H_5), \quad HCl=427\cdot813.\\ N\,HC_6H_4O\,(CH_3)\end{cases}$$

TRADE MARK: 210294/1898. Renewed 1911.

PATENT: 24287/1897, became void in the 8th year.

A white crystalline powder, ***soluble*** 6 in 100 of water. 1% has been used as a local anæsthetic and for subcutaneous injection in eye surgery, and 1 in 1,000 for infiltration. 2% solution in dentistry. Has been used as anæsthetic in conjunction with Mercuric Cyanide in syphilis. Incipient cataract treated with Potassium Iodide Injections 1%, beginning with ½ Cc., increasing to 1 Cc. A drop of 1% Acoine solution should be added to 1 Gm. of the solution.—B.M.J. ii./o8,779.

Benzamine, Betacaine. *Syn.* **✱Eucaine Hydrochloride.** Eucaine or Eucain B. Benzoyl-vinyl-diaceton-alkamine or Trimethyl-benzoxy-piperidin Hydrochloride, P. Helv.

$C_5H_7N(CH_3)_3(C_6H_5COO).\ HCl=283\cdot721.$

TRADE MARK: EUCAINE, 193242 of 1896. Registration renewed 1909.

PATENT: 20697 of 1896. Became void in the twelfth year. Now public property.

The process of manufacture was worked out recently by Prof. Thorpe at the Imp. Coll. of Science and Technology, South Kensington, who will, we believe, give notes on the matter to those wishing to manufacture.

Dose.—$\frac{1}{10}$ to $\frac{1}{2}$ grain (**0·006 to 0·03 Gm.**) or more.

A synthetic compound allied to Cocaine, in small white opaque crystals, ***soluble*** about 1 in 30 of water (Crystals may deposit on cooling which can be redissolved without harming the salt). 2% solutions are used in ophthalmic work (**Guttæ R.O.H.** 2 or 5%). They may be boiled without decomposing the salt.

Sterules, Hypodermic contain Eucaine $\frac{1}{4}$ and $\frac{1}{2}$ grain. For dental extraction.

Local Infiltration Anæsthesia by **Eucaine** is suitable for very short operations.

Powders are prepared for producing the 2 in 1,000 solution of eucaine for infiltration, containing eucaine 3 grains (**0·2 Gm.**) and sodium chloride 12 grains (**0·8 Gm.**) to produce $3\frac{1}{2}$ ounces (**100 Cc.** approx.) of solution. This is practically **isotonic**—*c.f.* P.J.i./12,357.

The solution is boiled for a few minutes just before use. A small flask of hard glass marked on the neck for 100 Cc. is convenient for accuracy and for boiling. In the operation 50 Cc. or more of the solution is injected all round the region to be dealt with.

Gelatin Capsules (Slip-over variety) containing the ingredients in the same amounts also useful—added to 100 Cc. of boiling water (on cooling, 10 minims Adrenalin Solution may be added). This is sufficient for any ordinary operation.—B.M.J. ii./13,70.

Eucaine and Adrenalin combined should be used for the more serious operations.

Professor Barker employed 10 minims of adrenalin solution (1 in 1,000) added to the 100 Cc. of the boiled eucaine solution. This quantity is usually sufficient for an operation, but occasionally as much as 200 Cc. have been used (=6 grains of eucaine, which is considered a maximum dose). The adrenalin produces a localised anæmia, and so checks hæmorrhage. It also restrains the toxic effects of the eucaine. (This solution is isotonic. The dose of cocaine capable of killing a rabbit is harmless if combined with adrenalin).—B.M.J. ii./04,1683 *See* also **Barker's Stovaine-Glucose Solution.**

Removal of thyroid tumours. After injecting 100 to 150 Cc. of the above Solution, allow at least $\frac{1}{2}$ hour to elapse before operating. The toxicity of the eucaine is reduced by the adrenalin.—Barker, Pr. Sept. '07, p. 329, *et seq.* Morphine at the outset may be desirable.

'Solubes' Eucaine, 1 and 5 grain (**0·06 and 0·3 Gm.**) for making injections, also **'Solubes' Eucaine** and **Sodium Chloride** are prepared, each containing Eucaine **0·05 Gm.** and Sodium Chloride **0·2 Gm.,** to be dissolved in 25 Cc. of sterile water to make the solution for infiltration, as with the powders previously described.

Nebula Eucainæ.

Eucaine 10 grains, Sodium Sulphate 4 grains, Distilled Water 1 ounce. **Ophthalmic Lamels** contain $\frac{1}{100}$ and $\frac{1}{50}$ grain.

Adreucaine Sterules contain Eucaine $\frac{1}{12}$ grain and Adrenalin

$\frac{1}{4000}$ grain in 8 minims ($\frac{1}{2}$ Cc.), for dental and surgical use. For tooth extraction the contents of one (or two) sterules are injected into the gums ten minutes before operating.

A. E. Barker advised this Eucaine—Adrenalin infiltration for operation on varicose veins.—Pr., Oct. '10, p. 463.

Tablets of Eucaine are made $\frac{1}{10}$ grain (**0·006 Gm.**) for internal use.

Unguentum Eucainæ.

Eucaine 1, Olive Oil 2, Hydrous Wool Fat 7. For pruritus, Menthol 2% may be added.

Benzaminæ Lactas (*Off.*). *Syn.* Eucainæ Lactas.

$C_{15}H_{21}O_2N.CH_3CHOH.COOH=337{\cdot}316$.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain. (**0·008 to 0·03 Gm.**).

A white crystalline salt.

Soluble about 1 in 5 of water and about 1 in 8 alcohol (90%).

Incompatible with salicylic acid.

For ophthalmic work and in dentistry employ 2 to 3%; for infiltration 0·1% with Sodium Chloride 0·8%; for regional anæsthesia 2·5%; nose, throat and ear 10 to 15%. Solutions can be boiled.

Slower in action than cocaine, less toxic, and anæsthesia more prolonged, while the heart is not affected, nor the pupil dilated.

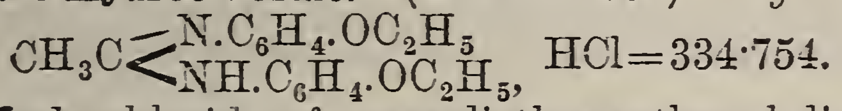
For tetanus and poisoning by strychnine 3% solution used.—L. ii./05,887. Sciatica cured by injections.—B.M.J.E. i./05,44.

Larnygeal tuberculosis.—Relief of pain of, by injecting a solution of Eucaine 2 grains in 1 ounce of 80% alcohol with a blunt needle. *Dose.*—About 1 to 2 Cc. into the laryngeal nerves.—Dundas Grant's method.—L. ii./13,1111.

Urethral Injection. 1 to 2% solutions may be used to relieve pain.

Sterules (Hypodermic) of **Eucaine Lactate** $\frac{1}{4}$ grain (0·016 Gm.), also $\frac{1}{2}$ grain (**0 03 Gm.**).

***Holocain Hydrochloride.** (T.M. 202036). *Syn.* **Phenocain.**



$$CH_3C{<}\genfrac{}{}{0pt}{}{N.C_6H_4.OC_2H_5}{NH.C_6H_4.OC_2H_5,}\ HCl=334{\cdot}754.$$

The Hydrochloride of para-diethoxyethenyl-diphenylamidine in small colourless shining crystals.

Soluble 1 in 55 of water. *Incompatible* with Alkalis.

As an anæsthetic in ophthalmology, 2 to 5 eye drops of 1% solution, but not adapted for hypodermic use.—L. i./97,1466.

Sterules of Holocaine Hydrochloride Solution 1% are prepared.

***Alypin.** (T.M. 268134 and 322518). *Syn.* **Amydricaine, Benzoyl-tetramethyl-diamino-ethyl-di-methyl-carbinol Hydrochloride.**

$C_6H_5COC_2H_5CO.[CH_2N(CH_3)_2]_2HCl=314{\cdot}776$.

Dose (Internally).—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).

Crystalline powder melting at 169° C. *Soluble* in Water 1 in 1 and 1 in 4 Alcohol 90%.

Solutions 0·025 to 0·5% or up to 10% (strong solutions keep well, but weak ones may become cloudy; may be sterilised by boiling), efficient in eye work,—2% strength produces insensibility of cornea in sixty seconds. Non-toxic. It produces no mydriasis nor disturbance of accommodation.

For lumbar anæsthesia has been used in $\frac{1}{4}$ to 1 Cc. injections of 2% solution.

For infiltration 0·01 to 0·1% solution has been used with same quantities of Cocaine Hydrochloride in 0·2% Sodium Chloride Solution.

In dentistry 1 to 2 Cc. of 1 to 2% solution sufficient. 1 or 2 drops of Adrenalin solution may be added.

In sickness and post-operative vomiting internally it acts like Cocaine.

Alypin Nitras. Is compatible with silver nitrate.

Has vasodilator action, not constrictor like Cocaine.—B.M.J E. ii./08,4.

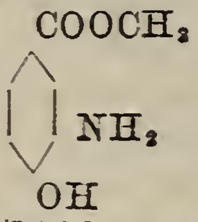
Alypin Tablets, ⅓ grain, dissolved in 1 Cc. water produce a 2% solution suitable for use in *dentistry* and minor surgery, and for eye work (also made with Suprarenin Borate 1/5,000 grain).

Tablets, ⅚ grain, dissolved in 1 Cc. produce a 5% solution suitable for *local anæsthesia* and for nose, ear, throat and urinary tract (also made with Suprarenin Borate 1/2,000 grain).

Tablets, 3⅓ grains, dissolved in 1 Cc. produce a 20% solution for *anæsthetising* surfaces by local application (also made with Suprarenin Borate 1/2,000 grain).

Injectio Alypin cum Suprarenin R.O.H. — Alypin 1, Suprarenin 0·0025, Sterilised Distilled Water to 100.

Aminobenz, '∗ Orthoform, New,' the Methyl ester of *Meta*-amido *para*-oxy-benzoic Acid (Methyl-amino-oxybenzoate P. Helv.).



=155·122.

T.M.: Orthoform, 215951/1898, renewed 1912. Patents 12,179/1897 and 22,106/1898. Both ***Expired.***

Manufacture.—The following steps are involved:

Oxidise *p*-Nitro-Toluene with Chromic Acid and Sulphuric Acid to *p*-Nitrobenzoic Acid. Reduce this with Zinc and Hydrochloric Acid to *p*-Aminobenzoic Acid. Diazotise with Sodium Nitrite and Hydrochloric Acid and heat to form *p*-Hydroxy-Benzoic Acid. Convert this into its Methyl-Ether by means of Methyl Alcohol and Hydrochloric Acid Gas. Nitrate with Nitric and Sulphuric Acid mixture to produce *m*-Nitro-*p*-Oxy-Benzoic Methyl Ester and finally reduce to the *m*-Amino compound as indicated in the formula.

Note.—The reductions here are the principal difficulties. As reducing agents worthy of consideration are Sodium Disulphide and Sodium Hydrosulphite.

Dose.—1½ to 3 grains (**0·1 to 0 2 Gm**) for cancer and painful ulceration of the stomach.

A white crystalline powder, possessing local analgesic and antiseptic properties. Is slightly soluble in water, in alcohol 90% 1 in 7.

The **Hydrochloride** $C_6H_3.OH.NH_2$ $COOCH_3,HCl=191{\cdot}620$ is soluble about 1 in 9 of water; action of base is more prolonged.

A 10% aqueous solution of the hydrochloride is used, or 10 to 20% with anoline or paraffin ointment or collodion solution of pure orthoform, or this as a dusting powder, may be employed to alleviate pain in sores or burns, but has little action unless there is a breach of surface.

Has relieved whooping-cough and laryngeal tuberculosis by insufflation.

Insufflatio Orthoformi cum Resorcin, C.L.T.E. Resorcin 2½ drachms, Orthoform to 1 ounce.

∗Kerocain (T.M. 373550). *Syn.* ∗Novocain. **Para-Amino-Benzoyldiethyl-Amino-Ethenol Hydrochloride.** Ethocaine.

$C_6H_4\ (NH_2)\ [CO_2.C_2H_4N.(C_2H_5)_2]\ HCl=272{\cdot}663.$

Dose, subcutaneously.—⅕ to 1 grain (**0·012 to ·06 Gm.**).

= Trade Mark 'Novocain' No. 276477. Permission to use granted to British firm. 'Suspension in favour of.'—See C.D. Oct, 20/17, p. 890.

A licence to use the enemy patents (*vide* 17162/1905) was also granted to a British firm. This patent is not in the process of manufacture but in the production of a compound of therapeutic value.—C.D. i./16,653.

So far as we are aware there is only one British firm making the compound.

A colourless crystalline salt melting at 156° C. Soluble 1 in 1 of water. In absolute Alcohol 1 in 30 nearly (by experiment). A cocaine substitute. 0·25 to 2% solutions are for hypodermic use.

Incompatible with Alkalis, Tannin, Calomel, Potassium Dichromate, Potassium Permanganate and Silver Salts. With the latter use Novocain Nitrate, *s.a.*

Uses.—A powerful local anæsthetic, but its effect is very transient. A drop of 5% solution anæsthetises the conjunctiva sufficient for superficial operations. It is well tolerated by the tissues.

Dislocations reduced by 0·5% Solution injected directly into the joint and around ligaments and periarticular tendons.—B.M.J.E. ii./09,6. Anæsthetic action is less than Cocaine, but Adrenalin increases it.—F N. 1909 A poor substitute for cocaine.—B.M.J. ii./09,120.

Infiltration Anæsthesia has been practised by 200 Cc. of 0·5%. Solution in Normal Saline—a maximum dose—this is sufficient to anæsthetise the area for most operations. 50 to 75 Cc. is enough for a moderate size elbow. 150 Cc. for a knee.

The following **Tablets** are prepared with addition of Adrenalin:—

(A.) **For Infiltration Anæsthesia of Thick Layers of Tissue and Hypodermic Injections in General Surgery.**

Novocain 0·125 Gm. Adrenalin 0·000125 Gm.

Dose.—One tablet dissolved in 25 Cc. Normal Saline Solution makes a ½% Novocain Solution. *Max. dose.*—125 Cc.

(B.) **For Anæsthesia of Nerve Centres and Larger Nerves (Local Anæsthesia.)**

Novocain 0·1 Gm. Adrenalin 0·00025 Gm.

Dose.—One tablet dissolved in 5 Cc. Normal Saline Solution makes a 2% Novocain Solution. *Max. dose.*—5 Cc.

(C.) **For Spinal Anæsthesia.**

Novocain 0·05 Gm. Adrenalin 0·000083 Gm.

Dose.—One tablet dissolved in 1 Cc. Normal Saline Solution makes a 5% (Isotonic) Novocain Solution. One to 3 Cc. may be used.

(D.) **Without Adrenalin.**

Novocain 0·2 Gm. Sodium Chloride 0·09 Gm.

Dose.—One tablet dissolved in 10 Cc. sterile distilled water makes a 2% Novocain Solution.

(E.) **Dental Tablets.**

Novocain 0·02 Gm. Adrenalin 0·00005 Gm.

Dose.—One tablet dissolved in 1 Cc. Normal Saline Solution makes a 2% Novocain Solution.

1 to 2 Cc. for one or two extractions.

NOVOCAIN DENTAL SOLUTION (2%). *Dose.*—1 to 2 Cc. is also prepared:—

Novocain 0·02 Gm. Adrenalin Solution (1 in 1000) 1 drop. Sodium Chloride 0·006 Gm. Thymol 0·0006 Gm.

(F.) **Without Adrenalin.**

Novocain 0·05 Gm.

One tablet dissolved in 1 Cc. Normal Saline Solution gives a 5% Novocain Solution.

Fischer's Modification of Ringer's Saline Solution (*q.v.*) is sometimes used instead of Normal Saline Solution for the above. Kerocain may replace Novocain.

Injectio Novocainæ cum Suprarenin, R.O.H.—Novocain 1 or 2, Suprarenin 0·00125, Sterilised Distilled Water to 100.

Dose.—*Up to* 1 drachm of the 2%; *up to* 2 drachms of the 1%.

In eye work may be employed, *e.g.*, for excision of the lachrymal sac, also for other minor operations.

Toxic symptoms during use of Novocain. 2 drachms of 1% Solution with $\frac{3}{4}$ minim of 1 in 1,000 Adrenalin Solution caused the pupils to be widely dilated and fixed. Consciousness had gone and a cold, clammy sweat broke out. Pulse slowed, body became rigid for fully a minute. Recovery with Strychnine. —L. i./13,561. Death from use in dental work.—B.M.J. ii./10,2052.

Sterules, Hypodermic of Novocain, $\frac{1}{3}$ grain (0·02 Gm.), also **Novocain** $\frac{1}{3}$ grain (0·02 Gm.), **with Adrenalin** 1/1,000 grain, are prepared.

Toxicity and destructive power on tissues much less than of Cocaine.—B.M.J. ii./09,783. On the other hand one reads :—

Novocain-Suprarenin Spinal Anæsthesia.—In 63 cases, three of incomplete anæsthesia, six in which Ether had to be used, one of collapse and another of "air hunger."—L. ii./13,1854; *see also* Pr. 1911,240.

Novocain with Strychnine is also employed for producing spinal analgesia (*see also* Tropacocaine and Stovaine).

Regional Anæsthesia is a form of local anæsthesia, using a stronger solution than that for local infiltration. A small quantity is introduced round the nerve trunks, which supply the parts to be operated on at some part of their course, which is anatomically accessible. This form of anæsthesia has been effected with a Solution of Novocain 2, Sodium Chloride 0·5, Distilled Water 100. Five drops of a 1 in 10,000 Solution of Adrenalin are added to each 20 Cc. of Solution immediately before use.—For Technique *vide* Felix Rood, B.M.J. ii./12,1701.

Supraclavicular Anæsthetization of the brachial plexus with 20 Cc. of 2% Novocain Solution, with addition of Adrenalin. Stated to be convenient and free from danger. By its use severe operations on the arm can be performed painlessly and without shock. Definite paræsthesia must be obtained in the arm and hand before the injection is made.—B.M.J. i./13,388.

Intra-arterial anaesthesia, by 50 to 100 Cc. of 0·5% Novocain into an artery circulation being arrested by a tourniquet. Analgesia develops in 1 to 2 minutes.—B.M.J. ii./13,392.

Spinal Anæsthesia with Novocain. 5% solution with Mannitol. Dose varied from 0·06 to 0·08 Gm. of Novocain. No safer than Stovaine and larger dose has to be used.—C. C. Holman, L. i./16,955.

Novocain $\frac{3}{4}$ Gm., Magnesium Sulphate $\frac{1}{2}$ Gm., in water or saline 100 Cc. Boil and when cold add Adrenalin solution 1 Cc. to each 30 Cc. This amount is usually enough to completely anæsthetise wound area—cranial injuries in war.—J. Anderson, B.M.J. ii./17,42.

Kerocain and Cocaine solutions with adrenalin in concentrated form for dilution a convenient number of times, *e.g.*, 1 : 40 satisfactory in use. A 15% Sodium Chloride solution is bactericidal; with addition of $7\frac{1}{2}$% Cocaine is slightly less bactericidal and with $7\frac{1}{2}$%Kerocain is still less.—H. Macnaughton Jones, L. i./18,904.

Intrasacral extradural injection of Novocain. A new method for operations on hæmorrhoids, fistulæ, and other conditions in and about the anus.

Dose.—20 Cc. of 2% Novocain to which five drops of 1 in 1000 Adrenalin solution is added—the amount of Novocain thus exceeds 6 grains. 15 grains have been used in a local or regional anæsthesia and even 35 grains have been used.—S. R. Meaker, B.M.J. i./19,569.

Novocain, Identification of, see Vol. II.

∗**Amycaine** (T.M. 382126). *Dose.*—**0·02 to 0·05 Gm.** A compound of Amyleine which is di-methyl-amino-benzyl-pentanol with Novocain. Prepared in sterile saline in various dosages. (*a*) For small operations; (*b*) double strength of (*a*) for more lengthy ones; (*c*) the same strength as (*a*), but double the quantity in the ampoule. Each ampoule contains in addition a small dose of adrenalin. A local anæsthetic, lasting and widespread.—L. i./18,725.

Anesthone—PARA-AMIDO-BENZOIC-ETHYL-ESTER. AMINO-BENZOIC-ETHYL ESTER; PARA-AMIDO-ETHYL BENZOATE; BENZOCAINE. ∗ANÆSTHESINE (T.M. : 244958/1902, Renewal suspended).

$NH_2.\ C_6H_4.\ COO.\ C_2H_5 = 165{\cdot}143.$

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) in powder or cachets.

Manufacture.—Prepare *p*-Nitro-Toluene by adding slowly Nitric Acid (Sp. Gr. 1·4) 105 and Sulphuric Acid 175 to Toluene 100 keeping the temperature of the mixture below 20° C. The product contains about 35% of the *para*-body, the reminder being mostly *ortho-* (with very small amount of *meta-*).

The *para-* compound is separated by cooling to 5° C. in a freezing mixture. The *para-* body readily separates in yellow needles, which must be removed rapidly either by centrifuge or filter pump while the temperature is low, otherwise the crystals redissolve as the temperature rises to normal.

Crystalline *p*-Nitro-Toluene 50 is now oxidised to *p*-Nitro-Benzoic Acid by boiling with Chromic Anhydride 250 and Sulphuric Acid 110 diluted with water 450. (*p*-Nitro-Benzoic acid forms yellow crystals with M. pt. 238° C.)

The next step is to reduce with iron and hydrochloric acid to *p*-Amino-Benzoic Acid and finally convert into the ethyl ester by dissolving the body in absolute alcohol and passing dry Hydrochloric Acid into the solution,

(Note: It is better to proceed in the above order than to reduce the *nitro* group before oxidising the methyl group. *p*-Nitro-Toluene will of course be available commercially in normal times, and the same remark applies to *p*-Toluidine in the event of the alternative order of synthesis being selected.)

Note.—PATENT 16,684/1903 lapsed in 1908. Corresponding U.S. Patent 761,998/1904 granted to E. Ritsert and W. Epstein, deals with the manufacture of Esters of 3 : 4 *Di*amido-benzoic Acid.

An example of the manufacture given in this patent specification *starts* from the above Ethyl-*p*-amido-benzoate, which is converted into the Acetyl compound, this into the nitro compound, this into Ethyl-meta-nitro-*p*-amido-benzoate which is reduced to Ethyl 3-4—diamido-benzoate.

The compound is almost insoluble in water, ***soluble*** 1 in 8 of alcohol 90%, also 1 in 50 of Olive Oil, and easily in Ether, and Chloroform. M. pt. 90 to 91° C. Has a numbing taste.

To relieve hyperæsthesia of the stomach and dyspepsia; local insufflations for pharyngeal and laryngeal affections, bougies for urethritis 3 grains, and suppositories 10 grains for hæmorrhoids. Ointments 10% for burns, eczema, and intertrigo.

Local use relieves the pain of inoperable cancer.—B.M.J.E. ii./03,32.

Pneumococcic (and tuberculous) infection of the throat—in a case of difficulty in swallowing greatly relieved by applications of anæsthesine dissolved in Palm Oil—in form of a spray.—B.M.J. i./09,1527.

✶ **Rhinoculin** (T.M. 308800) **Cream, Powder** and **Spray** contain Anæsthesin, Paranephrin, Subcutin, Glycerin and Boric Acid, for use in hay fever.—Gehe.

Anesthone Cream.

Anesthone 10%, Adrenalin Chloride 0·005% in Ointment basis. A quantity the size of a pea applied to the nasal mucosa when necessary gives relief in hay fever and as a palliative in allaying irritation, congestion and inflammation of the nasal mucous membrane.

Anesthone Tape ½ inch wide for "packing" is also made.

✶ **Subcutin** (T.M. 255643).—ANÆSTHESINE *p*. PHENOLSULPHONATE.
$C_6H_4.COO.C_2H_5NH_2.C_6H_4OH.SO_3H = 339 \cdot 281$.

Crystalline white powder soluble 1 in 100 Water. Used for infiltration in 0·8% Solution under the name of Subcutol.—L. ii./05,1582; F.N. 1906,271.

***Stovaine** (T.M. 261296).—*Syn.* BENZOYL-ETHYL-DIMETHYL-AMINO-PROPINOL HYDROCHLORIDE Ph. Ital. $C_6H_5CO.C_2H_5.CH_3CO.CH_2N(CH_3)_2.HCl$=271·716.

Dose.—Per os and hypodermically ⅓ to ¾ grain (**0·02 to 0·05 Gm.**). For lumbar anæsthesia, *dose* from ⅓ to 1½ grains (**0.02 to 0.1 Gm.**).

Maximum dose.—2 grains (**0·12 Gm.**).—B.M.J. ii./05,95.

In small white crystals, M.pt. 175° C. ***Soluble*** (by experiment) in water about 1 in 13, in alcohol 1 in 3, almost insoluble in ether.

Uses.—Anæsthetic (2 to 4% in eye work), vaso-dilating, comparatively non-toxic. It is stated not to cause nausea, vertigo, or syncope.

Intraspinal Anæsthesia with Stovaine.

(A.) Stovaine-Glucose Solutions (*mainly.*)

"The ideal solution for anæsthesia should be of such strength as to be of the same osmotic tension as the blood serum. It should neither produce shrinking nor swelling of the blood or tissue cells by osmosis."

A. E. Barker communicated to B.M.J.i./08,244, results of 100 cases of Spinal Anæsthesia. See also B.M.J. ii./10,736 ; i./12,597. He employed 1 *Cc. injections of* 5% *Stovaine with* 5% *Glucose*—without any Adrenal derivative of any kind. Often the dose may be reduced to 0·8 Cc., sometimes increased to 1·2 Cc. A 2 Cc. 'Record' syringe with Bier's hollow needle in pure *Nickel* is used. The Sp. Gr. of this solution is 1·0230.

Using this solution—of relatively greater density than that of the Liquor Spinalis (which is 1·0070)—a small dose of the Anæsthetic drug can be employed—the severest operations can be performed. By carefully adjusting the curves of the spine beforehand to suit the purpose in hand either a high or low anæsthesia can be produced by gravitation. In the amputation of a limb, for example, the lower of the two (whilst the patient lies on his side) can be anæsthetised whilst the upper remains entirely unaffected by the drug. The lowering of the head in any operation is not favoured. The best results are obtained by not altering the level of the body after injection, excepting in cases of the labouring class advanced in life, where the spinal column may be almost rigid—here the pelvis may have to be raised. Usually 5 to 10 Cc. of cerebro-spinal fluid is withdrawn before injection. Any alteration of posture may be made providing the relative levels of head and pelvis remain as before.

The equivalent of 0·06 Gm. Stovaine found to be sufficient for nearly all purposes. As a rule anæsthesia was established in 5 to 7 minutes for the groins and 8 to 10 for the epigastrium. There is almost always pyrexia (rarely higher than 101° F.). In no case sign of post-operative shock. Longest period of analgesia (using 0·08 Gm.) was 2 hours, largest total dose 0·135 Gm. Highest analgesia—to clavicles.—Pr. Aug. '09,165.

The solution used is as stated antea—the average dose being 1 *Cc. of the* 5% *Stovaine and* 5% *Glucose Solution, i.e.,* 0·05 Gm. of each—rarely the dose was raised to 0·06 Gm., often it was reduced to 0·04 Gm. Review of 500 cases varying from severest abdominal to the most insignificant fistula in ano.—L. McGavin and R. D. O'Leary, Pr. Mar. 1912.

The canal is punctured between second and third lumbar interspaces,—patient in sitting posture. 5 Cc. of fluid allowed to escape and then the injection made. Anæsthesia within ten minutes, and lasts for about an hour. Headache following relieved by Phenacetin. Advantages—absence of post-operative shock, complete muscular relaxation, no venous engorgements or respiratory movements, no starvation, and no post-operative sickness. Contra-indicated in cases of advanced sepsis.—C. H. Allen, L. i./13,1100.

A Personal Experience of Spinal Analgesia.

Operation for radical cure of right inguinal hernia. Stovaine was injected between second and third lumbar spines with patient lying on right side of table with his knees drawn up and lumbar region arched. Slight prick of needle in the skin felt. Patient was afterwards surprised to learn that the pin prick had been the injection. After a minute or two a warm glow spread down right leg accompanied by tingling and feeling as if leg were swollen. Five minutes after injection pin prick in third lumbar area was felt only as a pressure. About ten minutes after injection patient was turned on his back and operation was commenced. Any slight sensation of operation seemed to refer to the left side instead of right. About 40 minutes after injection sensation began to return; about two hours after injection all signs of the action of Stovaine seemed to have disappeared. As sensation returned intense pain was felt in the wound. It lasted for six hours and then gradually passed off—L.ii./10,324.

Operation for varicose veins. The linear pressure of the knife felt only like a firm lead-pencil stroke. Loss of motion in the limbs accompanied the anæsthesia and returned in two hours, ordinary sensations being restored in three. No unpleasant symptoms occurred during the operation; the injection was made between the second and third lumbar vertebræ.

Tuffier favours the *intradural* method of spinal anæsthesia. He is not in favour of Strychnine nor Suprarenin added to the fluid. The *extra-dural* injection made between the sacral and coccygeal vertebræ is a less valuable method. Novocain regarded as safest.—B.M.J. ii./13,392; L. ii./13,554,1854;

W. W. Babcock reports 5,000 cases, chiefly under Stovaine. Pre-existent shock a contra-indication to the method. Neurotics unsuited.—L. ii./13,1855.

Bedeschi reports 924 spinal stovainisations. *Dose* given, 0·04 to 0·075 Gm. In one case as result of inverting the patient the analgesia reached to the top of the head. Pallor, sweating, nausea, and rectal incontinence not infrequent. —L. ii./13,1855.

0·9 Cc of the Solution (=0·045 Gm. Stovaine) maintains analgesia to level of the umbilicus for 45 minutes. 400 operations with good result.—Maj. J. W. H. Houghton, R.A.M.C., L. ii./12,1008;

Spinal Analgesia in a variety of operations with Stovaine 0·04 Gm. Sodium Chloride 0·0011 Gm., water 1 Cc. Stovaine itself is antiseptic; the solution is heated to 80/90° C. for 10 minutes.—N. M. Bey, L. ii./18,141.

For abdominal operations spinal anæsthesia has very strong claims. It is a gain to have a completely flaccid abdominal wall and quiet thoracic respiration. Barker's heavy solution satisfactory.—J. Morley, L. ii./16,728. P. P. Cole *ibid.* 645 prefers 10% Stovaine solution in Saline.

Stovaine preferred to Novocain.—F. S. Rood, L. i./19,14.

B.) Stovaine-Dextrin Solution (TYRRELL GRAY).

This Solution contains Stovaine 3%, with Dextrin, Suprarenin, &c. Employed at the Great Ormond Street Hospital for Sick Children.

'Sterules' 1·5 and 2 Cc. (=0·045 and 0·06 Gm. Stovaine) of the Solution are prepared.

The diminished toxicity of Stovaine is due to the fact that it is very slowly diffusible. This property is accelerated by administering it with diffusible fluids. Dextrin is a suitable addition, it being readily soluble, and innocuous to the tissues. It appears to play a considerable part in controlling vomiting. It also delays absorption, so that no cases of Stovaine poisoning were observed by its use.

Normal Saline is also used in strength isotonic with cerebro-spinal fluid, for it has been shown that though the diffusibility of Dextrin-Stovaine Solution is above that of cerebro-spinal fluid when estimated in relation to water, yet when introduced into cerebro-spinal fluid, changes take place which make its diffusibility considerably less than laboratory experiments indicate.

Pain, even after the most severe operations, so slight that it was rarely, if ever, necessary to give hypnotics. Food, except where contraindicated, can be given immediately after the operation if wanted.—L ii./09,913,991.

A case of enterectomy under spinal anæsthesia of Stovaine and Dextrin—in an infant seven months old—recovery.—L. i./10,364; B.M.J. ii./11,497.

Chaput says, in persons over 40 the intraspinous ligaments are often calcified, and so a lateral puncture or incision through the structures under Ethyl Chloride Spray is necessary. He withholds food and gives Chloral Hydrate and Potassium Bromide ½ hour in advance. He excludes children under 12.—L. ii./13,1855.

Tyrrell Gray, on the other hand, strongly advocates the method for even very young children.—B.M.J.ii./13,392; L.ii./13,554; *see also* B.M.J.ii./11,497.

(C.) Ⓟ**Stovaine Strychnine Solution** (JONNESCO).

Dose.—From 0·01 Gm. Stovaine with Strychnine Sulphate ⅓ mgr, for ages 1 to 5 years, up to 0·1 Gm. Stovaine with 1 mgr. Strychnine, dissolved in 1 Cc. Sterile Water for adults

The higher doses to be used with caution.

Sterules of all the above strengths are prepared.

Through fear of the Stovaine interfering with the action of the heart and lungs, operations have been confined to parts below the waist line, but the employment of Strychnine in conjunction was believed by Jonnesco to render such operations safe, but the method does not show a high percentage of safety. Strychnine is not always to be depended upon for prevention of respiratory paralysis. Stovaine anæsthesia is not entirely devoid of danger.

Pain in the limbs and back, and headache are common after effects.

Potassium Sulphate 0·25 to 0·5% added to local Anæsthetics, useful—increases the effect.—B M.J. ii./14,351, *c.f.* *Note* to Potassium Sulphate.

Indications and Contra-indications for Spinal Anæsthesia.

Spinal analgesia should be restricted to certain exigencies. Cases for which local or venous anæsthesia are inadequate—operations involving danger of great shock, severe injuries associated with shock, urgent operations. For rectal surgery, prostatectomies, *abdominal operations especially,* but operations above the umbilicus, *e.g.,* thyroidectomy and extirpation of the larynx, are performed with it.—B.M.J. ii./10,766; Pr. 1911,227 *et seq.*

Tyrrell Gray finds the method of value in diminishing shock, valuable in *renal disease,* disease of the *lungs,* and when *muscular relaxation* is desirable.—B M.J. ii./10,766.

Contra-Indications.

Operations which can be performed under either local or venous anæsthesia with sure success. Acute Infective Diseases, Suppurating processes in the neighbourhood adjacent to the proposed site of puncture; alterations in the spinal column, diseases of the central nervous system, recent syphilis, high temperature from some unknown cause; if the patient cannot rest in bed for 24 hours after the injection. Hysterical, very excitable and nervous patients. In these cases a subcutaneous injection of one or more doses of Scopolamine and Morphine one or two hours prior to the injection of the Anæsthetic Solution into the spinal canal works well. The excitability no longer existing, spinal anæsthesia can be proceeded with.—Pr. 1911, p. 227 *et seq.*

For method of examining urine and liquor cerebralis for Stovaine eliminated see Vol. II.

Untoward Results with Stovaine.

For spinal anæsthesia deleterious effect on the kidneys, several cases of acute nephritis reported. Tropacocaine and Novocain (*q v.*) stated to be better.—Na. Nov. 25, '09, p. 99.

Examination of nervous system of 13 persons who died after injection of Stovaine into the lumbar canal.—B.M.J. ii./08,524.

Paralysis after intraspinal injection of 5% solution.—B.M.J.E. ii./08,3.

Urinary retention with Spinal Stovainisation lasting for one to several days. This only occurs exceptionally with Cocaine.—L. ii./08,1214.

For use of **Stovaine with Adrenalin** *v.* **Adrovaine.**

P1 Stovaine Solution. ***For Internal Use.*** *Dose.*—For persistent vomiting 5 to 10 minims every 2 hours without either food or drink. Later 3 to 5 minims before a meal:—

Stovaine 15 grains, Atropine Sulphate ½ grain, Morphine Hydrochloride 3 grains, Chloroform Water 1 ounce.

Compresses 5 to 10%. **Gargle** 0·5% (flavoured).

Glyco-Gelatin Pastils $\frac{1}{20}$ grain (0·003 Gm.). **Stovaine Snuff** for coryza 1 to 5% with Bismuth Carbonate and Milk Sugar are used.

Stovaine Ointment for painful wounds and hæmorrhoids:—

Stovaine 3 grains, Adrenalin Solution 90 minims, Paraffin Ointment 1 ounce.

***Neocaine** (T.M. 374724). A compound allied we understand to Stovaine. It is used in conjunction with Adrenalin;

Apothesine. *Syn.* GAMMA-DIETHYL-AMINO-PROPYL CINNAMATE. An anæsthetic with action as profound and more persistent than Cocaine. The effect is not produced quite so quickly. Less toxic than Cocaine.

Tablets 1¼ grain. One in 60 minims of water makes a 2% solution.

Tablets ⅗ grain with Adrenalin $\frac{1}{1600}$ grain. One in 30 minims of water makes a 2% solution with 1 in 50,000 of Adrenalin.

Dental Tablets ⅓ grain with $\frac{1}{2500}$ grain Adrenalin to dissolve in 18 minims of water.

Solution containing 1·5% Apothesine with 1 of Adrenalin in 60,000.

P1 CODEINA (*Off.*). U.S. PH. NED. FR. CX.

$C_{17}H_{18}(CH_3)NO_3,H_2O=317·284.$

Dose.—¼ to 2 grains (**0·016 to 0·12 Gm.**). (*Off.* ¼ to 1 grain), FR. CX. has *maximum single dose* ¾ grain, maximum during 24 hours 3 grains approximately. U.S. average ½ grain.

An alkaloid from opium or from morphine, in nearly colourless trimetric crystals. ***Soluble*** 1 in 80 of water, very soluble in diluted acids, in alcohol 90% 1 in 2, in chloroform and in excess of aqueous ammonia, but insoluble in excess of potash solution. It is a methylic ether of morphine—monomethyl-morphine.

Flavoring.—It has a slightly bitter taste, *vide* Morphine.

Uses.—In moderate doses in hypnotic and in small doses frequently it allays cough in phthisis. In diabetes beginning with a ¼ grain thrice daily it lessens the amount of sugar in the urine. A useful sedative in chronic cystitis with enlarged prostate.

For cough following catarrh ½ to 1 grain gives relief.—Tilley.

In tuberculosis relieves the night cough.—Dixon, Pr. XC., 1.

Diabetes insipidus, a case of, under treatment with Codeine and restricted liquids.—L. i./14,16.

Ⓟ Codeine and Glycerin Jelly. *Dose* —1 drachm=⅓ grain Codeine approximately.

Codeine 72 grains, Citric Acid 720 grains, Refined Gelatin 6 ounces, Glycerin 36 ounces, Oil of Lemon 1 drachm, Balsam of Tolu and Distilled Water of each *q.s.* Make the Tolu water as ordered in B.P. for making syrup of tolu; of the liquor so prepared take 30 ounces; in 25 ounces of it soak the gelatin, heat till it is dissolved, and add the glycerin. In the remaining 5 ounces of liquor dissolve the Codeine and citric acid, add the solution to the above, add also the oil of lemon, stir well together, and pour into bottles to 'set.' Useful in chronic laryngitis, phthisical cough, &c. Also in ulcer of the stomach.

Ⓟ**Pastillus Codeinæ.** $\frac{1}{8}$ grain in each.

$\boxed{\text{P 1}}$**Pilula Codeinæ Composita.**

Codeine $\frac{1}{4}$ grain (increased to 2 grains if necessary), Extract of Nux Vomica $\frac{1}{2}$ grain, Extract of Lettuce $\frac{1}{4}$ grain or more. To make one pill, to be taken two or three times a day, for diabetes.

Note.—Use Mucilage not syrup as excipient.

Ⓟ**Capsulæ Codeinæ et Valerianæ Compositæ** = **Pilula Codeinæ et Valerianæ Composita** in the last Edition. The drugs are too deliquescent for a pill.

Dose.—One or more *p.d.* according to strength, Codeine $\frac{1}{3}$ to 1 grain, Valerian Extract 2 grains, Phenol 2 grains, Cascara Extract $1\frac{1}{2}$ grains. In glycosuria, Codeine is the most valuable drug for treatment. The Valerian acts as nerve sedative, the phenol as disinfectant for the intestinal canal. The combination has been found helpful.—G. Rankin, B.M.J. i./13,597.

Ⓟ**Trochisci Codeinæ** contain $\frac{1}{8}$ grain (**0·008 Gm.**).

Ⓟ**Capsulæ Codeinæ cum Extracto Cannabis Indicæ.**

Codeine $\frac{1}{2}$ grain, Extract of Indian Hemp $\frac{1}{4}$ grain.

In neuralgia one every 4 or 5 hours.—P.J. ii./10,298.

$\boxed{\text{P 1}}$**Codeinæ Hydrobromidum.** $C_{18}H_{21}NO_3HBr+2H_2O=416{\cdot}228$.

An anti-spasmodic similar in dose and use to the phosphate. For eye work has been advised to take the place of Ethyl-Morphine—being said to cause less pain.—Pres., Jan. 1911, 4.

$\boxed{\text{P 1}}$**Codeinæ Hydrochloridum.**

$C_{18}H_{21}NO_3.HCl, 2H_2O=371{\cdot}768$.

Dose.—$\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**). White crystalline powder, soluble 1 in 20.

$\boxed{\text{P 1}}$**Codeinæ Phosphas** (*Off.*). U.S. P. JAP. FR. CX.

$C_{18}H_{21}NO_3.\ H_3PO_4,2H_2O=433{\cdot}324$.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**). FR. CX. has max. during 24 hours 5 grains approximately.

In granular snow-white crystals, soluble 1 in 4 of water. Contains 69·05% of anhydrous alkaloid (on salt$+2H_2O$), and is most suitable for hypodermic injection, 1 grain in 6 minims

Ⓟ**Syrupus Codeinæ Phosphatis** (*Off.*).

Dose.—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**).

Codeine Phosphate 0·5% in a solvent of Distilled Water and Syrup. (Slightly over 8% stronger than B.P. '98.)

Ⓟ**Tablets, Compressed, of Codeine Phosphate** $\frac{1}{4}$ and $\frac{1}{2}$ grain.

Ⓟ**Linctus Codeinæ, G.H.** *Dose.*—1 to 2 drachms.

Syrup of Codeine 1, Syrup of Virginian Prune, 1.

St. Th. H. has same strength of Codeine, but different vehicle.

Ⓟ**Syrupus Picis cum Codeina,** *v.* Pix Liquida.

P1 Codeinæ Sulphas, U.S. $(C_{18}H_{21}NO_3)_2H_2SO_4$, $5H_2O$ = 786·62.
Average dose.—$\frac{1}{2}$ grain (0·03 Gm.).
Given with advantage in sciatica.

P1 Codeine-Methyl-Bromide. *Syn.* Eucodeine.
$C_{17}H_{18}CH_3NO_3.CH_3Br$=394·217.
Dose.—$\frac{3}{4}$ grain (0·05 Gm.). Is less toxic than codeine.

P1 Apocodeinæ Hydrochloridum. $C_{18}H_{19}NO_2.HCl$=317·720.
Dose.—$\frac{1}{10}$, gradually increased to 1 grain (0·006 to 0·06 Gm.) A greyish powder soluble in water.

Manufacture.—By heating a concentrated solution of zinc chloride with codeine.—U.S.D., 19th Edn., p. 378.

A good expectorant hypodermically. Solution must be neutral; dose up to 25 minims of 2% solution. Internally, 10 to 30 minims of 1% solution caused no nausea or vomiting, but produced free expectoration. In pill 3 or 4 grains daily may be safely given.—B.M.J. i./91,455.

Uses.—Is a sialogogue and sedative and increases peristalsis.

As **Hypodermic Purgative,** 30 minims of 1% solution = $\frac{1}{3}$ grain (0·02 Gm.), produced purgation in half an hour without vomiting.—B.M.J. ii./02,1247. But certainly in our knowledge may prove emetic.

Apocodeine acts in 10 to 15 minutes. It owes its action to inhibitory effect on non-striped muscle and has therefore only limited action.—Gordon Sharp, Pres., March, 1913.

COLCHICUM.

Syn. Meadow Saffron. Colchicum Autumnale. (*Liliaceæ*). Both **Corm** and **Seeds** are *Off*. and U.S. F.I. requires the seed for the preparations of Colchicum. The Corm is in U.S. with not less than 0·35% Colchicine.
Average dose.—4 grains.
The seed U.S. has 0·45% Colchicine. *Dose.*—3 grains.

Ⓟ Tinctura Colchici (Seminum) (*Off.*). Now 1 in 10 Alcohol 70% as required by F.I.=Fr. Cx. B.P '98 was 1 in 5 of alcohol 45%.
Dose.—5 to 15 minims (0·3 to 1 Cc.).

Fr. Cx.—Max. Single Dose—25 minims, and max. during 24 hours 100 minims approx.—and P Belg. have this strength.

Ⓟ Vinum Colchici (*Off.*). 1 of Corm in 5 of Sherry.
Dose.—10 to 30 minims (0·6 to 2 Cc.).
Is given in mixtures with alkali and magnesium sulphate.
In gout controls the inflammation, 30 minims as first dose, then 15 minims, every three hours.—Whitla, Pract. Med.

Flavoring.—It is not objectionable to the taste.

Ⓟ Liquor Antirheumaticus Compositus.
Dose.—30 minims (2 Cc.).
Colchicum Wine 15, Spirit of Æther 5, Camphor 2, Compound Tincture of Lavender to 30. A preparation used on these lines in Denmark contains Ammoniacum in addition.

Ⓟ**Extractum Colchici** (*Off.*). The inspissated juice of fresh Corms —as B.P. '98. *Dose.*—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

U.S. is an alcoholic extractive washed with Benzine, evaporated, assayed and adjusted with Starch to contain 1·25 to 1·55% colchicine. Fr. Cx. extracts seeds with 70% alcohol, not standardised. Max. single dose $\frac{3}{4}$ grain, max. in 24 hours 3 grains approx.

Uses.—Removes the gouty swelling and congested state of joints by increasing the circulation, and so eliminating the obnoxious metabolic products of the disease.

Frequently given in pill with ipecacuanha and mercury.

To abolish the vomiting and diarrhœa often primarily produced (by increase of peristalsis) a small dose of atropine may be given with it.

Ⓟ**Fluidextractum Colchici Seminis, U.S.**

Dose.—3 minims. Standardised to 0·4% (average) Colchicine.

$\boxed{\text{P}1}$***Colchicina.** Fr. Cx.

$$C_{15}H_9(O.CH_3)_3 \left\{ \begin{matrix} NH.CO.CH_3 \\ CO.OCH_3 \end{matrix} \right\} = 399{\cdot}32.$$

Dose.—$\frac{1}{100}$ to $\frac{1}{32}$ grain (**0·0006 to 0·002 Gm.**) in a pill.

Fr. Cx. has *maximum single dose* $\frac{1}{32}$ grain; max. during 24 hours $\frac{1}{16}$ grain approximately.

This active principle is a yellowish crystalline powder, ***soluble*** in water, alcohol and chloroform, slightly soluble in ether. It is a weak base, most of its salts being decomposed by water. Of use in acute gout, rheumatic gout, asthma, cerebral congestion, and uræmia.

$\boxed{\text{P}1}$**Pilula Colchicinæ, Hyoscyami et Nucis Vomicæ.**

Dose.—One every three or four hours.

Colchicine $\frac{1}{70}$ grain, Hyoscyamus Extract $\frac{1}{2}$ grain, Nux Vomica Extract $\frac{1}{4}$ grain, Sugar of Milk $\frac{1}{2}$ grain. Rapidly relieves gout.—A. P. Luff, B.M.J. i./14,635.

Toxic Action. Colchicum affects the gastro-intestinal membrane, causing severe pains in the bowels, of the nature of colic, vomiting, diarrhœa, intense thirst, and violent burning in the throat, œsophagus and stomach.—L. i./03,1254.

Colchicine 34 mgr. taken over a period of 19 days with 6 to 8 drachms of Laville's Liqueur caused paralysis. The palsy persisted for nearly a month. Even after 6 months not entirely cured.—B.M.J.E. i/15, 19.

Antidotes.

Evacuate the stomach. Give water and demulcents—white of egg, oil, barley water. Apply heat to feet. Stimulants.

$\boxed{\text{P}1}$**Colchicine Salicylate.**—*Syn.* **Colchi-sal.**

$C_{22}H_{25}NO_6.C_6H_4OH.COOH = 537{\cdot}403.$

Dose.—$\frac{1}{60}$ grain (**0·001 Gm.**).

A yellowish powder, ***soluble*** in water.

To prepare this salt mix Colchicine 20, with Salicylic Acid 7, moisten with water so as to combine and evaporate carefully.

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* Note.—Some would regard this and preparations of Colchicum as non poisonous.

Ⓟ **Capsules of Colchicine Salicylate.**

Contain $\frac{1}{250}$ grain Colchicine dissolved in methyl salicylate. Used in rheumatism and gout. *Dose.*—One every two hours.

Gloriosa Superba (*q.v.*) contains Colchicine.

COLLODIUM.

Collodion (*Off.*).—*Syn.* CONTRACTILE COLLODION.

A solution of Pyroxylin in an ether-alcohol mixture. Keep from naked light. Pure ether answers better. In preparing, solution is more rapid by adding the pyroxylin to the alcohol and afterwards the ether—as now used (*Off.*). **Acetone** is also a good inexpensive solvent, but the disadvantage is that the film is opaque. **U.S.** has Pyroxylin 4, Ether 75, Alcohol 25.

FR. CX.—Pyroxylin 5, 95% Alcohol 20, Ether (0·724 at 15°) 75.

Pyroxylin (dinitrocellulose $C_6H_8(NO_2)_2O_5=252{\cdot}114$ is prepared by the action of nitric and sulphuric acids on cotton. It is freely soluble in Methyl Alcohol, Acetone, Amyl Acetate, Glacial Acetic Acid, and Ether mixed with an equal volume of either Ethyl or Methyl Alcohol.—P.J. ii./06,657. In making **gun-cotton** (trinitrocellulose) $C_6H_7\ (NO_2)_3O_5=297{\cdot}116$ the mixture of acids contains a larger proportion of nitric acid and the time of action is longer. This body is insoluble in a mixture of Alcohol and Ether.

Pyroxylinum, U.S. gives double the molecular formula—

$C_{12}H_{16}(ONO_2)_4O_6=504{\cdot}228$.

Some comparative experiments which we conducted with a view to improving on '**Collodion**' gave the following :—

Collodium Aceto-Æthericum.—Pyroxylin 5, Acetic Ether *q.s.* to 100. The odour is a slight objection, otherwise the best substitute so far found. Does not pucker the skin anything like so much as the B P. preparation. Is simple in making. Consistence excellent.

Is not more irritating in use than Collodion (*Off.*). Adheres closely and is transparent. *See E.P.* xiii, p. 311, and xv., p. 322, *for other formulæ.*

Collodium Acetonum B.P.C.—Pyroxylin 5, Clove Oil 2, Amyl Acetate 25, Benzol 20, Acetone to 100. U.C.H. adopts this. Another formula Pyroxylin 5, Camphor 1 dissolve in Acetone 90, and make up to 100. Evaporates more slowly than ordinary collodion, but makes stronger film.—Am. Jl. Ph., 1906,470.

P1 **Anodyne Colloid.**—*Syn.* AMYL COLLOID.

Amyl Hydride ½ ounce, Absolute Alcohol ½ ounce, Aconitine 1 grain, Veratrine 6 grains, Collodion to 2 ounces.

For neuralgia, sciatica, lumbago, all muscular pains, &c. The amyl by its rapid volatilization often produces almost instantaneously the desired result; but should the pain continue the alkaloids can be brought into activity by applying a piece of moist spongio-piline over the collodion film.

***Celloidin,** (T.M. 14460). Pyroxylin purified by solution in alcohol and ether (in which it is again soluble). Is used to imbed microscopical specimens and in surgery to close wounds. A solution in acetone is called Filmogen. **Photoxylin** is a similar preparation.

Note.*—'Celloidin Collodium**' is also a Trade Mark (No. 14461):

Celloidin Solution.

Celloidin 1, Methylated Ether Sp. Gr. 0·720, 3½, Absolute Alcohol 3½, all by weight.

Rubber Glove Substitute.

Celloidin 5, Ether 48, Alcohol 46½, Castor Oil ½. Dip the hands in the solution—it soon dries, and forms a flexible covering.

To remove, wash with equal parts of alcohol and ether.

'New Skin' is a somewhat similar preparation.

Collodium cum Oleo Crotonis.

Croton oil 1 part mixed with 7 parts, more or less as required, of Flexible Collodion, forms a useful counter-irritant; a thin layer painted on quickly dries and its action is limited to the spot to which it is applied.

Collodium Flexile (*Off.*).

Contractile Collodion with addition of a small proportion of Canada Turpentine and Castor Oil, makes a more elastic film than Contractile Collodion, U.S. is similar.

Pyroxylin dissolved in acetic ether adheres closely and is pliable. See our experiments under Collodion.

Collodium Elasticum, P. Austr., Ph. Ned. Collodion 98, Castor Oil 2. Fr. Cx. has Collodion (Fr. Cx. *q.v.*) 95, Castor Oil 5.

Collodium Benzoini.—*Syn.* Kelly's Paint.

Add Compound Tincture of Benzoin 3 to Collodion 1, shake until mixed and add Glycerin 1. Keep well corked and shake before use.

As an antiseptic covering to slight wounds. It dries slower than ordinary collodion, but gives a harder film. Used in New York Hospitals.—C.D. i./14,73.

Collodium Iodi.

Iodine 1 (more or less if required) to 15 Flexible Collodion, sustains the action of the iodine and the film protects the part. Recommended for ringworm, alopecia, chilblains and frostbite.

Collodium Salicylicum.

Salicylic Acid 1, Flexible Collodion (¾ strength) 5. For use on exposed parts like the next preparation.

Collodium Callosum.

Salicylic Acid 8, Extract of Indian Hemp 1, Flexible Collodion (¾ strength) 60. A rapid and painless solvent for corns and warts. **Collodium Acidi Salicylici**, L.H. is similar.

Collodium Salicylicum cum Zinci Chlorido.

Salicylic Acid 2, Zinc Chloride 1 Collodion 15. Forms a clear solution. This and the above have proved useful in epithelioma.

Ⓟ**Mercuric Chloride** to the extent of 1 in 30 or more of Salicylic Collodion may be used to warts.

Collodium Salicylicum et Lacticum.

Salicylic and Lactic Acids, of each 10, Collodion 80. Lactic Acid, being destructive to morbid growths, is said to increase its efficacy.

Collodium Stypticum.—*Syn.* **Styptic Colloid.**

Absolute Alcohol 16, Benzoin 1½. Dissolve, filter, and add Tannic Acid 16, Gun Cotton 1½, Purified Ether to 100. Mix, set aside three days, and decant. Useful in checking various forms of hæmorrhage when it can be brought in contact with the bleeding surface.

Camphoid, a substitute for Collodion.

A solution, 1 in 40, of pyroxylin, in equal parts by weight of camphor and absolute alcohol. May be used as a vehicle for the application to the skin of such drugs as iodoform, phenol, salicylic acid, resorcin, iodine, chrysarobin, and ichthyol. Iodoform dissolves in it to the extent of 1 in 10. The preparation dries in a few minutes, leaving a film, which is not easily washed off.

Celluloid. Made by dissolving Pyroxylin 50 in a solution of Camphor 25 in ether 100 and manipulating the mass until it has become plastic. It is then dried. Colours may be incorporated.

It is supplied in thin sheets and being light, rigid and washable, is useful in surgery for splinting; it is rendered plastic by rolling up and macerating in hot spirit for a few minutes; it may then be wrapped round the limb with a layer of wool outside and quickly sets. N.B.—Very inflammable. Celluloid was originally called **Xylonite.**

Soluble according to our work more readily in Acetone than in Amyl Acetate, but the film resulting in the first case is liable to be opaque. Mixtures of these solvents are sometimes used. A collodion can be readily made strength 1 in 20 using equal parts of the solvents. (The celluloid should be shredded).

Celluloid Splints made by coating a layer of stockinette, previously spread over the 'model,' with a 10% Solution of Celluloid in a solvent such as Acetone several times. The model is made by pouring a semi-liquid mixture of Plaster of Paris and water into the well oiled cast and leaving it to set. Pieces of gauze appropriate to the model are also used and incorporated with the Celluloidal layers. After setting cut down with a sharp knife.—J. Wicliffe Peck, P.J i./13,5.

Acute polyomyelitis treated with Celluloid Splints (formula given).—L. ii./14,216.

Perforated Celluloid 0·15 Mm. thick rendered softer by soaking in 5% Carbolic Lotion, placed next to a wound where there has been much loss of skin with the usual dressing above; relieves the pain of redressing. Thicker suitable for making splints.—S. R. Douglas, L. ii./16,558.

Celluloid Plates in Plastic Surgery placed beneath deep cicatrices without causing irritation, also celluloid solution in acetone successful also a secret preparation. The solutions found preferable.—C. Higgens, L. i./16,643

Celluloid 5% in Acetone excellent adhesive for use in applying traction.—B.M.J. ii./18,376.

Pexuloid.—A special solution to produce light strong non-inflammable celluloid splints. The method is similar to the above the whole being finished with a special splint varnish. As used at the Hospital for Sick Children, Great Ormond Street, London.

COLLOIDAL METALS.

Certain Metals and Metalloids in the form of Colloidal Solutions have latterly been considerably used in therapeutics. We have arranged our account of the subject under the following headings :—

A. **General Characters.**

B. **Verification of the Colloidal Condition.**

C. **Manufacture,** methods of (previously published). (1) by Chemical Methods, (2) by Electrical,—Bredig's and numerous other Processes.

D. **Patents** governing Manufacture.—(1) Chemical, (2) Electrical.

E. Our experiences in the **Manufacture of Colloidal Metal Solutions,** together with details of **Physiological Experiments** which we have had conducted, and the **Therapeutic Uses** and **Dosage** of Colloidal Metals of Commerce, (1) Chemically produced, (2) Electrically produced.

F. **Antiseptic Powers** of Colloidal Metal Solutions.

G. **Metal Organosols.**

H. **General References.**

Interspersed under the various headings we have placed brief abstracts, notably to the Jl. of Chemical Society's Abstracts of the very considerable literature of the subject dealing with the Chemistry and Physics of Colloids.

A. General Characters.

Thomas Graham devised the term **Colloidal** (from Κολλα= glue) to distinguish between the amorphous substances in solution, which diffuse with difficulty, and the **Crystalloid** substances, *i.e.*, those crystallising easily from Solutions and which diffuse quickly from their solutions into a water stratum, or which pass with ease through membranes, *e.g.*, those employed in the process known as dialysis. Glue and Gelatin are typical examples of Colloidal substances,—they do not exhibit the property of diffusion in this manner.

This differentiation is however no longer held. The view is that colloids and crystalloids are not different kinds but rather different states of matter, the same chemical substance being obtainable in one state or the other according to how it is made. Many substances which might be regarded as typical crystalloids have been produced in the colloidal condition. For theoretical study see 'Chemistry of Colloids and some Technical Applications.'—W. W. Taylor, 1915 (E. Arnold).

It appears that in 1846 Selmi applied the term 'pseudo-solutions' to Colloidal Solutions and recognised their characteristics.—Guareschi, J.C.S.A. ii./11,261.

It is pointed out that the distinguishing feature between Crystalloids and Colloids, viz., diffusibility or non-diffusibility, through a membrane, is not characteristic of a substance in all its solutions, for example, in water Sodium Chloride is in true solution, whilst in dry Benzole it is in a colloid state.—P.J. i./14,109.

Certain other liquids, *e.g.*, Alcohol, Glycerin and even Sulphuric Acid in addition to water have the property of producing Colloidal Solutions. Graham differentiated, *e.g.*, **Hydrosols, Alcosols, Glycosols**, etc., or organic solvents may be classed collectively as **Organosols.** Broadly speaking, these Solutions are merely suspensions of minute particles of the Colloidal substance uniformly distributed, so that the suspension appears homogeneous to the naked eye. Homogeneity is, however, not always seen, *e.g.*, in the case of '**Gels**' if the Colloids have swollen or have been formed by coagulation. In such cases one can have macroheterogeneity (naked eye) or microheterogeneity,—in which the heterogeneity can only be seen by the microscope.

The two, or more, constituents of a Colloidal Solution are called 'phases.' If the total mass of the particles are *in contact* the phase is termed the '*dispersion medium*' while the phase consisting of isolated particles is known as the '*disperse phase.*' In some instances the '*disperse phase*' may be of the nature of a fibrous frame, *e.g.*, like a sponge or mesh-work, through which the dispersion medium permeates.

Colloids dispersed in solution usually show a contraction in volume corresponding to quantity, in other words the density cannot be obtained by calculation.

The *Osmotic pressure* of Colloidal Solutions is very small.

The particles of the 'disperse phase' show '*Brownian*' *Movement.* Those the diameter of which exceed 3 to 5 μ do not show it. A theory as to the cause of the phenomenon is that the particles possess internal heat energy.

The *optical property* of a Colloidal Solution is usually that of dichroism, *i.e.*, transparency by transmitted light and relative opacity by reflected light.

Electrical Properties.—The disperse particles are charged with + or − electricity.

Amongst the +charged are the Metallic Hydroxides, Silicic Acid and Basic Dyes, *e.g.*, Methyl Violet, Methylene Blue and Magdala Red in Water. Amongst the − charged are all the Metals, Metallic Sulphides, and certain Dyes such as Indigo, Eosin, Fuchsin, also Mastich, Gamboge and Starch—all in water.

On passing an electric current into a Colloidal Solution the + charged particles move towards the cathode and the − towards the anode.

Some Colloidal Solutions show the property of coagulation or precipitation when submitted to heat, or by mechanical means—or they may be transformed into jellies—the insoluble body being called a 'gel' (Graham designated Colloidal substances in liquid form 'Sols' and in jelly form 'Gels.')

On coagulation the substances may be either 'reversible' *e.g.*, Aqueous Solutions of Gelatin, Glue, Gum, or 'irreversible' to the original form, *e.g.*, Ferric Oxide, Alumina, Gold, Silver, Platinum. The Inorganic Colloids are mostly irreversible and are precipitated by very small amounts of some Salts, while large amounts of other Salts have no effect. The reversible includes mainly the Organic Colloids—these are not so sensitive to the coagulating action of the electrolytes.

All metallic Colloidal Solutions require *protection* by some Organic Colloid such as Gelatin, Albumin, etc. *Unprotected electrically prepared Colloids are so unstable that they would probably have to be freshly prepared for use every day.*

R. Zsigmondy expresses the protective effect of different substances by the 'gold value,' *i.e.*, the number of milligrammes of a Colloid which are just capable of protecting 10 Cc. of a Gold Solution containing 0·0053 to 0·0058% of Gold from coagulation by 1 Cc. of a Sodium Chloride Solution containing 100 Gm. of Salt in 900 Cc. of Water.

Gelatin and Glue	have a gold value	0·005 to 0·01.
Egg Albumen and Gum Arabic	,, ,, ,,	0·1 to 0·25.
Dextrin	,, ,, ,,	6 to 20.
Potato Starch	,, ,, ,,	about 25.

Note.—The reader should not misunderstand these figures; the Gelatin has the greatest protective power and Starch the least.

Regarding the size of the particles in Colloidal Solutions, V. Pöschl classifies their magnitude as from 20 μ μ. to 0·1 μ.μ. Above the former one may speak of mechanical suspensions. The latter figure is approximately the extreme limit of divisibility. It is, according to this authority, the upper limit to the absolute size of molecules (or atoms).

Relationship of colour of Colloidal Solutions and size of the particles (gold, silver, platinum, mercury, copper, etc.).—W. Ostwald, J.C.S.A. ii./11,868 *see also* ii./12,240.

Colloidal metals were recently called by the somewhat imaginary names **'metallic ferments'** or **'artificial enzymes.'** The reason of this is that the natural enzymes are all colloidal bodies—the natural enzymes are catalytic substances, *i.e.*, they have the power of inducing chemical changes in other bodies without themselves becoming altered. The hydrosols of several of the metals (Platinum, for example) under discussion have this catalytic property which resembles enzyme action in many respects, hence the analogy.—B.M.J. i./12,252, *et seq.*

Amongst bodies known in **both Colloidal and Crystalloidal conditions** may be mentioned :—

I. INORGANIC SUBSTANCES :—

(1). **Elements.**—
  (*a*) Metals :—Light Metals—Potassium, Sodium, Lithium, Barium, Strontium, Calcium, Magnesium, Aluminium ; all the common heavy metals.
  (*b*) Metalloids :—Carbon (?), Phosphorus, Sulphur, Selenium, Silicon, Boron.
(2) **Sulphides**—of all the common heavy metals.
(3) **Oxides and Hydroxides.**—Phosphoric Acid and Oxides of heavy metals.
(4) **Salts.**—*e.g.*, Sodium Chloride, Sodium Carbonate, Mercurous Chloride.

II. ORGANIC COMPOUNDS :—

Alkali Salts of Palmitic, Oleic, etc., Acids.
Egg Albumen.

Substances known in the Colloid state only.

I. INORGANIC SUBSTANCES :—

(1) Hydroxides of Magnesium, Aluminium, Thorium, Manganese, Bismuth, Copper, Iron, Gold, etc.
2) Certain Salts and Compounds, *e.g.*, Copper Ferrocyanide, Berlin Blue Molybdenum Blue.

II. ORGANIC SUBSTANCES :—

Varieties of Starch, Dextrin, Inulin, Tannins, Caoutchouc, Resins, etc. Glue, Isinglass) Agar Agar.

B.—Verification of the Colloidal Condition.

With regard to the *examination* of a Colloid Solution there are varying identifying characters. (1). Naked eye examination (already mentioned)—dichroism ; further there is fluorescence (especially characteristic of many Hydrosols). (2). Appearance on examination with the ultramicroscope. (3). Indiffusibility. (4). Stability at higher temperatures. (5). Instability in presence of certain electrolytes—alteration by these is a permanent characteristic of Sols. If stable, protective Colloid is probably present.

☞ Fractional Diffusion as a means of ascertaining uniformity of fine suspensions or homogeneity of Colloidal Solutions Diffusiometer for —J.C.S A ii /12 1146.

For a further consideration of the subject from the theoretic aspect, R. Zsigmondy's 'Colloids and the Ultramicroscope'—English translation by J. Alexander—(Chapman & Hall)—should be consulted The nomenclature of the subject, which we have briefly given, is the same as employed in the last-mentioned work. The book deals largely with the size of the particles in Colloidal Solutions, *e.g.*, of Gold, Platinum, Palladium, etc., and their motion in the medium.

C.—Methods of manufacture previously published.

1.—Chemical Methods.

Aluminium Hydroxide Hydrosol was first made by W. Crum with a freshly prepared Neutral Aluminium Acetate as starting point (for details *v.* V. Pöschl).*

Aluminium Hydroxide Colloid intravenously produces death in animals but Calcium Chloride added prevents it—J.E.R.McDonagh, B.M.J. i/17, 565.

Arsenic.—A solution of Arsenic Chloride in Absolute Alcohol at −15° C. added to a Solution of Hypophosphorous Acid in the same solvent at −15° C. gives a brown precipitate which contains 68·2% Arsenic and 0·97% Phosphorus and gives a Colloidal Solution in dilute Alkali Solutions.—J.C.S.A. ii./07,948.

Bismuth.—Bismuth Hydrosol is obtained by reducing dilute Ammoniacal Solutions of Bismuth with Stannous Chloride.

Copper.—The method given by V. Pöschl produces a reddish brown Hydrosol with Water, but it is unstable.

Gold.—R. Zsigmondy gives details for reduction of Gold Chloride Solution with Potassium Carbonate or Bicarbonate.

Ferric Hydroxide Hydrosol was made by L. Péan de Saint-Gilles by prolonged boiling of a solution of Ferric Acetate. Acetic Acid is driven off—it is a process of hydrolysis.

Details of the process are given by Pöschl.

Manganese Hydrate Hydrosol was made by reducing Potassium Permanganate and washing the precipitate with water. After several decantations a dark brown Hydrosol forms.

Mercury.—A. Lottermoser uses Stannous Chloride or Stannous Nitrate for reducing Mercurous Nitrate (dilute Solution).

Platinum Group of Metals.—Lottermoser made a **Hydrosol of Platinum** by a method similar to that used by Zsigmondy for the preparation of gold Hydrosol. By previous dilution and subsequent dialysis a stable Hydrosol was obtained. **Hydrosols of Palladium, Rhodium** and **Iridium** were made likewise—the two latter are, however, unstable.

Selenium.—According to work of H. Schulze Selenium Hydrosol is obtained by reducing Selenic Acid (SeO_2) with a 7 to 8% Solution of Sulphur dioxide and cooling. Add excess of Ammonia and then neutralise the excess with Oxalic Acid. Centrifugalise the liquid—this separates the Colloidal Selenium from the medium. On dissolving it in water this produces a Colloidal Solution.

The Solution is coagulated by Potassium Chloride, Potassium

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* The Chemistry of Colloids, by Victor Pöschl, English Translation by H. H. Hodgson, C. Griffin & Co., 1910—a useful compendium of the early work. We acknowledge, with thanks, numerous abstracts from this book in the introductory portion of this Chapter.

Sulphate and Sodium Carbonate, not by Acetic, Tartaric or Oxalic Acids or Ammonia.

Silicic Acid (Soluble).—A typical example of the early work in Colloidal Chemistry.—For details V. Pöschl's, or other textbook may be consulted. Graham produced a Hydrosol of Silicic Acid.

Silver.—Carey Lea was the first to definitely discover Silver Hydrosol.

A. J. A. Prange in 1890 made an even purer Silver Hydrosol. The most concentrated solution made by him contained 4·75 Gm. of Silver per litre. It rapidly deposits a black precipitate. We give a modified Carey Lea method in the experimental work which has yielded us good results.

Solutions of Hydrazine Hydrate (1 in 2,000), Hydroxylamine Hydrochloride, and Hypophosphorous Acid have also been used as reducing agents for Silver.

A recent chemical method for making Colloidal Solutions, using Pyrogallol.

Silver Nitrate 3·58 Gm. in dry Pyridine 50 Cc. is treated with 25 Cc. of a solution of Pyrogallol containing 0·57 Gm. in the same solvent. The slightly yellow solution formed on diluting with water yields a Colloidal Silver Solution. Solutions containing 0·05 Gm. of Silver per 100 Cc. of liquid are fairly stable, and by centrifugalisation the greater part of the Colloid can be separated from them. Using Tannic Acid instead of Pyrogallol, the result is similar. Solutions of Copper Sulphate act similarly.—A. Pieroni (Gazzeta, 1913,43, i. 197—200), ex J.C.S.A. ii/13.393.

Sulphur.—According to M. Raffo [Koll. Zeit. ii., 358 (1908)] this is made by pouring a concentrated solution of Sodium Thiosulphate drop by drop into cold Concentrated Sulphuric Acid (Sp. Gr. =1·84). The Sulphur Hydrosol throws out Amorphous Sulphur in a few hours—this changes in time to Crystalline Sulphur.

Trillet's Method was to precipitate solutions of Metallic Salts with an alkali in presence of *Albumen*—forming types of Colloidal Solutions of the Metals—called Oxydases of the Metals. These *Alkaline* Solutions were found by Robin and Bardet to produce necrosis (as might be expected) in the tissues, and hence were abandoned for therapeutic purposes.—T. Stephenson, Pres., May, 1912. The process can, however, be so modified that the resultant dialysed) product is not alkaline.—W. H. M.

2.—ELECTRICAL METHODS

The disruption by the electric arc of metals into fine powder and to form dark liquids by employing terminals of the metal required has been in particular (of recent times) investigated by G. Bredig (1898). A direct current arc is used. The strength of current is 5 to 10 ampères. E.M.F. between 30 and 110 volts. Gold, Platinum, Palladium, Iridium and Silver Sols were made on these lines. Bredig showed that the cathode is the chief participant in the disruption.

Mollinari's Chemistry, Vol. I., 1912, p. 103–105, gives the following brief details of **Bredig's Process** for making a Hydrosol of Gold.

A current of 8 to 10 ampères at 100 volts passes through two gold wires 2 centimetres beneath the surface of 100 Cc. of Water (purest distilled), containing a trace of Sodium Hydrate, so as to produce an electric arc. The ends of the wires are 1 to 2 mm. apart.

The Svedberg and others have improved upon Bredig's process. Of the non-metals, Carbon, Silicon, Selenium and Tellurium were made in colloidal condition by the method.

Stable Colloidal Solutions may be made by electrolysing 5% Gelatin Solution containing 1% Sodium Chloride or Sodium Sulphate (to render slightly conductive) between metallic electrodes. The anode is in a glass vessel containing the Solution whilst the cathode composed of the metal to be made Colloidal is enclosed in an inner porous cell. Use continuous current, 3 to 5 ampères at 120 volts. Colloidal Solution forms in 10 minutes in neighbourhood of the anode. The liquid surrounding the cathode is free from metal. Gold Sol in this way containing 42 mgr. of Gold per litre was made. Silver 87 mgr. per litre; in one case 3·2 Gm. in 448 Cc. The Gelatin is decomposed partly, forming Protalbinic and Lysalbinic Acids.—C. Serono, J.C.S.A. ii./10,776.

Pure elemental **Arsenic** is best made by electrolysing an Alkaline Solution using Arsenic as anode, or better by electrolytic reduction of a solution of Arsenious Oxide 3 Gm. in a litre of 0·3% Sodium Hydroxide using a current of 2 to 3 amp. and 100 volts, a Platinum Cathode and Mercury Anode. Cool the solution during electrolysis and purify by dialysis. The addition of a trace of gum is useful for keeping. A solution made this way contained 0·07% Arsenic.—Lecoq (Compt. rend., 1910,150,700), J.C.S.A., 1910, ii./406.

High-frequency alternating currents passing between electrodes of the metal immersed in water have been used in a new method of preparing aqueous colloidal solutions of metals. Varying the range of frequency of the current between wide limits, it was found that the *colour* supposed to be *characteristic of the Colloidal Solutions of metals is a result of the special conditions of the discharge.*

Thus gold, on altering the frequency, can be made to give a red, blue or purple solution; in the red solution the particles are negatively charged and in the blue solution positively charged. The purple solutions contain both kinds of particles. The red solution is converted into the blue by the action of an electrolyte or electric field.—H. Morris-Airey and J. H. Long, Proceedings of the University of Durham Scientific Society (vol. V., part ii., pp. 68 and 113) per Na., Jan. 1/14. See also J.C.S.A. ii./13,1033.

For a complete study of all the methods of making Colloidal Solutions of Inorganic Substances, The Svedburg—"Die Methoden zur Darstellung Kolloider Lösungen Anorganischer Stoffe"—should be consulted.

D. Manufacture of Colloids, Patents for—

(1) Chemical—

British Patent No. 21,521/11, H. Crookes. Solutions of Peptone, Gelatin, Dextrin, or Meat Extract are used as vehicles for the preparation of Colloids. They are sterilised by boiling and contain varying proportions of Sodium Chloride. Solutions of Salts are then added, *e.g.*, Silver Chloride or Bromide, Mercury Bicyanide or Perchloride, Arsenious Acid and Salts of Thorium and Cobalt are mentioned as having strong germicidal action; and salts of Bismuth, Lead, Nickel, Iron and Aluminium as being weak germicides. The following is given as an example for the preparation of Colloidal Silver:—

Peptone 300 grains and Salt 800 grains are dissolved in 40 ounces of water.

Silver Nitrate 27·59 grains are dissolved in another 40 ounces of water, and added to the Peptone Solution. The whole is heated in a hot air oven for 48 hours at 100° C., and then filtered from the precipitate.

British Patent No. 28,776/1912, H. Crookes. To a solution of Peptone or like body, with or without the addition of Salt, a 0·1% Solution of the desired metal is added, then 0·01 to 0·1% of Phenol, and the whole boiled, *e.g.*, Silver Nitrate 27·59 grains, Water 40 ounces. Dissolve and add to a solution of Peptone 300 grains in 40 ounces of water, then add the Phenol and boil. Only 150 grains of Peptone are necessary in the preparation of Colloidal Iron.

Another example mentions Copper Nitrate with Peptone and Arsenate of Soda or dilute Potassium Iodide Solution instead of the Arsenic for the preparation of Colloidal Copper. The Peptone is said to be sufficient to reduce the metals without the use of Sodium Chloride. The Phenol prevents the Colloids from breaking down.

German Patent.—Chem. Fab. Von Heyden, D.R.P. 202,561.

Reduction of an alkaline solution (NaOH) of Arsenic in presence of egg albumen, gelatin, etc., by alkaline Pyrogallol. The solution is dialysed or precipitated by acid, washed and again dissolved in water. May also be precipitated by Acetone, Alcohol or a mixture of the latter with Ether.—J.C.S.A., 1909, ii./310.

British Patent No. 1219/1912 (A. DERING). **Preparation of Colloidal Mercury** by heating Mercuric Chloride in oils such as poppy, linseed, and the like containing Triglycerides. 5 parts of Mercuric Chloride heated with 100 parts Poppy Oil 20 minutes on open flame. The oil then dissolved in Ether washed with water, dried and freed from Ether. The oil thus produced may be used for medicinal purposes, *e.g.*, treatment of syphilis.

Colloidal Sulphur No. 7238/1913. Patented process by introducing Sulphur Dioxide and H_2S into dilute HCl. The bodies interact, forming Sulphur and Water: the former remains colloidal.—P.J. ii./13,216.

(2) **Electrical.**—

British Patents Nos. 14,369/1912 and 24,666/1912 relate to the separation of one Colloid (*e.g.*, a metal) from another, to which it is adsorbed by electrosmosis. Taking advantage of the difference in sign or potential of the charge in each, a diaphragm having the same sign or being indifferent to the pole may be used so that only the desired Colloid passes through. Also the pole may be isolated with another diaphragm in order to prevent decomposition of the ions of the desired body.

British Patent No. 29,049/1912 (Gesellschaft für Elektrosmose) describes the preparation of Colloids as follows:—To a Colloidal Solution of Albumin, Aluminium Hydrate, Carborundum, or Silica, one adds a solution of the desired metal and reduces it by means of Formaldehyde. It is then separated by electrosmosis.

In addition to the above abstracts of patents—a search of the Patents for the years 1898 to 1914 on this subject revealed a large number which have been taken out. Comparatively few have much relation with therapeutic use—several deal, for example, with the preparation of Colloidal Copper in batteries (depolarising medium), also for technical processes in recovery of metals in metallurgy and so on.

E. Our Experience in Manufacture of these bodies, together with details of the Colloidal Metals of Commerce and their Therapy.

A study of the literature brings out one point conclusively, namely, that the keeping properties of simple Hydrosols are by no means marked. Therapeutic agents of so tedious a nature to prepare as are some of these Colloids—which will not remain in their primary condition for more than a few weeks, are inconvenient for general treatment. The requisite presence of a 'protective substance' enders these Solutions distinctly indefinite. We would, in fact, erm some of these Colloidal Solutions *Compounds of the metals* *and protein decomposition products* of the metals in Solution, *i.e.*, Metals combined as Organic Salts. In the true Colloidal Solutions Gelatin or some other form of protective is a *sine qua non.*

Gelatin 3% and Glucose 5% found best for protection of suspension colloids.—J. E. R. McDonagh, B.M.J. i./17,565.

Therapy in General.—

It is held as of the greatest importance to have the particles in a Metallic Hydrosol in the finest possible subdivision as on this therapeutic activity depends.

It is an interesting fact that these Hydrosols are well tolerated—it has been stated that they are harmless in almost any amount. Physiological trials which we have had conducted support this. A metal, *e.g.*, Copper in fine particles would obviously not be greatly absorbed in all probability, excepting by cumulative action and ultimate assimilation. The conditions would be otherwise in the case of a reactive organic compound of Copper. Injected hypodermically or intravenously it is conceivable that the minute particles of a Colloid Metal may be reactive. Though relatively non-toxic, clearly reasonable precautions should be taken to avoid excess in treatment.

The Colloid Solutions are stated to have marked bactericidal action *in vivo* ; this is, on the one hand, due to their direct action (as shown by experiments *in vitro*) and on the other by the phagocytosis which they bring about when injected into tissues. (We deal with the subject of antiseptic power subsequently—purely *in vitro* it is in general comparatively slight, *e.g.*, on *B. Coli.*)

It appears that as the therapeutic effect is based on the leucocytosis which all these bodies produce, the actual *kind* of metal used is of less importance. B. G. Duhamel, L. i./12,90, thinks the reason for all the Colloidal Metals having similar effect is due to their being *physically* similar as distinct from their chemical nature. It has been held (P.J. i./14,513), that the first effect on injection of a colloidal metal is to cause hypoleucocytosis then an increase in leucocytes and a stimulation of the phagocytic power of these cells. **Colloidal silver** is specially favourable to the phagocytosis of *B. Coli* and *B. typhosus,* but has no effect on the phagocytosis of *B. pyocyaneus.* **Colloidal gold** stimulates the phagocytosis of the latter organism. **Colloidal Mercury** favours phagocytosis of *B. typhosus* and *Staphylococci,* but not *B. Coli* or *B. Pyocyaneus.* There is no parallelism between the antiseptic power and their influence on phagocytosis. It is stated furthermore (T. Stephenson, Pres., May, 1912), that the injections of electrically made Solutions cause *reduction of temperature,* increased excretion of urea and uric acid—hence Robin has produced good results with their use in pneumonia, articular rheumatism, etc.

We took the opportunity to manufacture some of the leading Colloidal Metal Solutions and our details of procedure are briefly given to assist those having occasion to work on the subject, and to condense the matter as far as possible we include herein details of other Colloidal Metals in Commerce with Therapeutic Notes.

Uses of Colloidal Metallic Solutions in general.—Subcutaneous, Intramuscular and Intravenous Injections of many of these have been given in infective conditions, *e.g.*, in pneumonia, pleurisy, peritonitis, influenza, typhoid, tuberculosis and other febrile conditions. They have also been used locally in cystitis, gonorrhœa, and epididymitis.

Copper and Selenium have been tried in malignant disease.

(1) CHEMICALLY PRODUCED.

Arsenic.

We obtained a Colloidal Solution by reducing a 1% Arsenious Acid with Hypophosphorous Acid in the presence of a protective of Gelatin (1/4%). The solution can be dialysed and diluted for use to the strength 1 in 2,000. 1 Cc. would contain ½ mgr. The reduction does not appear to work by any means so well in a dilute solution. This hydrosol, however, is not permanent, and is impracticable commercially.—W. H. M.

Pure Colloidal Arsenic is much *less toxic* than Arsenious Oxide to animals.—Lecoq. J.C.S.A. 1910, ii./434.

Antimony.—Colloidal Antimony made by H. Crookes found stable for 4 years. This is *chemically* made, for which reason it does not break down in the presence of electrolytes. Electrically made colloidal solutions are liable to revert to crystalloid form. The solution has antiseptic powers on a par with arsenic and silver. —L. Stroud, L. ii./16,768. See also C.D. i./13,793.

Antimony Sulphide Colloidal. *Dose.*—Intravenously up to 20 Cc. A solution of Tartar Emetic 0·5% is saturated with Hydrogen Sulphide. The Acid Potassium Tartrate formed is removed by dialysis. The red liquid is tested by titrating with decinormal Iodine in presence of Sodium Bicarbonate and the strength adjusted to 1 : 500. Glucose 5% is added to isotonise, Gum Arabic 0·5% to render stable, and Phenol 0·5% to preserve. In Kala-Azar with some success.—L. Rogers, L. i./19,505.

Copper.—V. Pöschl mentions a process of reduction of a Cupric Salt in the presence of Sodium Citrate or Sodium Tartrate. We tried this process but did not get much success with it and in any event some protective would be required. The method, as already stated, yields a brown Hydrosol which is unstable. Further we do not favour the use of a Tin Salt for a preparation for use therapeutically. We have, however, prepared the following :—

Colloidal Copper Solution. *Martindale.*

Dose.—5 Cc. subcutaneously, ½ to 1 Cc. intravenously, to be isotonised at time of use.

Manufacture.—On the lines of the process described by Gaube du Gers and W. Kopaczewski (Zeit. Chem. Ind. Kolloide 1911,9, 239–240, J.C.S.A. ii./12,51), with some modifications.

Strength 1 in 2,000.

The process is similar to that of Paal, *c f.* V. Pöschl, p. 65, viz., by warming the Copper Salt with a Sodium Albuminate Solution obtained by combining egg albumen and alkali. In the latter combination Lysalbinic and Protalbinic Acids are stated to be formed, which act as reducing agents. It is claimed the ultimate solution produced (there is no precipitate) retains the Copper in the colloidal form—the albuminous derivatives acting as protectives.

Keeping Properties.—Our experience is that this Solution keeps only when sterilised and subsequently filled into sealed containers

Pharmacological Reports on the Author's Colloidal Copper Solution.

Rabbit wt. 1·9 *kg.* injected (intravenously on successive days) with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for apparent dyspnœa after the largest dose.

Our physiologist adds : In all cases the dyspnœa was slight, and (possibly) due rather to manipulation than to the substances injected.

It seemed desirable in view of untoward results with another Colloidal Copper preparation reported below to have the above investigation which was provided in our last edition *repeated* for purpose of corroboration :—

Our physiologist reports (14/10/16) as follows upon :—

(A). Intravenous injections of the 1 in 2000 solution after isotonising on rabbits. Further,

(B). The effects of isotonised and of *not*-isotonised solutions were compared, by intramuscular injections, on cats.

(A). Tests by Intravenous Injections on Rabbits.

Rabbit I. Wt. 1·9 *Kg.*

5·0 Cc. was followed by very slight and questionable dyspnœa. 24 hours later further 5 Cc. produced no greater effect. 24 hours later further 10 Cc. produced distinct but temporary dyspnœa.

Rabbit II. Wt. 1·7 *Kg.*

5·0 Cc. was followed by distinct but slight and temporary dyspnoea and tremor. 5·0 Cc. on the following day produced distinct tenporary dyspnœa, but no obvious tremor. 10·0 Cc. 24 hours later produced pronounced dyspnœa tremor, and in-coordination, lasting about two minutes.

The antiseptic in the solution may be, in part, responsible for the effects observed.

(B). Tests by Intramuscular injections on Cats.

Cat I. Wt. 2·8 *Kg. Solutions isotonised.*

5·0 Cc. produced no obvious effect. 10·0 Cc. on the following day were followed by apparent slight salivation. The animal micturated two hours after the injection and showed little appetite in the evening. 19·0 Cc. 24 hours later led to slight dyspnoea, in-coordination and salivation. The animal emptied both bladder and rectum within half an hour and ate little or nothing in the evening. On the following day the animal was rather unsteady on its feet but ate well, and appeared normal 24 hours later.

Cat II. 2·5 *Kg. Solutions not isotonised.*

5·0 Cc. produced no obvious effect. 10·0 Cc. on the following day were followed by free salivation and micturition, and by loss of appetite. 20·0 Cc. 24 hours later led to immediate profuse salivation and to micturition. The animal became drowsy, defæcated, and ate little or nothing in the evening. On the following day it was still drowsy but took a little food. 24 hours later it was more active and ate more freely.

Conclusion.—As far as can be judged from these experiments the *omission* of salt from the injection distinctly intensifies the toxic effects of the copper. There is not very much difference but the results show that 5 Cc. is tolerated by a cat intravenously or intramuscularly.

Sterules of Colloidal Copper Solution (1 in 2,000) 5 Cc. are prepared.

Uses.—For injection into cancerous tissues.

A theory has been promulgated (Champy) that Colloidal Copper on the surface of its particles may supply oxygen necessary to prevent abnormal cell growth as in malignant disease. Copper particles can be found in a malignant growth after injection near the seat of infection.

INJECTIONS INTO TUMOURS according to our physiologist, 14/10/16, may produce untoward effects by washing the products of metabolism of the tumour into the blood stream.

It is possible that injection of normal isotonic saline solution used in this way may do more harm than an injection of an equal bulk of not-isotonised copper solution.

It is seen from our physiologist's latest report (above) that dyspnœa and defæcation may be provoked by the copper, but they may also be provoked by many other substances. It is obvious that any injection made into a tumour should be of the smallest volume possible. 5 Cc. in one place is probably rather much to inject into a tumour, though very little to inject into normal subcutaneous tissue or into muscle.

L. Drage referred to earlier work with organic copper and in particular to this Colloid. He found the solution therapeutically active. 5 Cc. injections were made twice weekly to a patient suffering from advanced carcinoma of the liver. Result, improvement in general condition and diminution in size of growth.—L. i./14,1651.

In cancer Colloidal Copper 150 to 400 Cc. (strength not stated) intravenously. Definite effect in some cases.—B.M.J.E. ii./15,15.

Recurrent cancer growth. Thirty-four injections of Colloidal Copper caused disappearance of a nodule on the liver.—C. Mansell Moullin, B.M.J. i /18,472.

✱ **Cuprase** (T.M. 386445).—Ampoules contain 5 Cc. for a dose, or commence with 2½ Cc. only.

A suspension of Colloidal Copper Hydroxide used for subcutaneous injection in cancer. Stated to arrest development of tumours. It may be necessary to give Cocaine 1/6th grain in advance.

Serious effects from use of Cuprase. Death resulted two weeks after the injection.—P. R. Cooper, B.M.J. i./17,48.

Rectal cancer. A few injections checked discharge and diminished pain but case terminated fatally. Another case of disease of uterus treated but cerebral inflammation put an end to life. Two further cases showed some improvement.—P. M. O'Brien, *ibid.*, 104.

No success in a case of multiple melanotic carcinoma; patient died.—A. Christie Reid, *ibid.*, 105.

After amputation of breast 8 injections. No local reaction whatever. Patient died.—W. H. Lowman, *ibid.*, 105.

Cancer of uterus improved.—H. Vallance *ibid.*, 137.

A further fatal sarcoma case.—C. de Rezendi, *ibid.*, 568.

Copper Phosphate (Colloidal) Suspension.

Dose.—Hypodermically 1 Cc. (=0·01 Gm. Copper Acetate) by a deep injection into the buttock.

Mix a solution of Copper Acetate 1 Gm. in Glycerin and Water of each 20 Cc., with a solution of Sodium Phosphate 5 Gm. in Glycerin and Water of each 30 Cc.

Tuberculosis has been treated by this injection. If the resulting reaction is slight the injection is repeated at discretion.—B.M.J.E. i./13,95.

Gold.—

We conducted numerous experiments, employing as reducing agents Hypophosphorous Acid, Formaldehyde and Hydrazine Sulphate (Gutbier's process as mentioned in V. Pöschl). The conclusion we came to was that Gutbier's method in which we used Gelatin as protective works satisfactorily. This Hydrosol can be boiled to sterilise.

The following which we devised is easy of preparation :—

Neutralise a Gold and Sodium Chloride Solution with dilute Sodium Carbonate Solution and adjust the strength to 0·05% Au. With 10 parts of this solution mix 10 parts of a Solution containing the calculated amount of Formaldehyde required to reduce the Gold, reckoning 3HCOH to 2 molecules of the Gold Compound. Employ Gelatin as protective. Warm to effect reduction and sterilise. The finished Hydrosol is to contain 0·025% (1 in 4,000) Au and the same amount of protective. It is **red** in colour.

Physiological Report.

Rabbit, Wt. 2·3 *kg.* injected intravenously on successive days with 2 Cc., 3 Cc., 4 Cc , 5 Cc., 7·5 Cc., and 10 Cc.

Result.—Well tolerated except for slight dyspnœa after the dose of 5 Cc. Two days after the last dose (10 Cc.) of Colloidal Gold this rabbit was given 10 Cc. of Colloidal Selenium, which produced slight dyspnœa.

Sterules of Colloidal Gold Solution 0·025% containing 5 Cc. are prepared and are suggested for injection. The solution may be approximately isotonised by adding 1 Cc. of 5·5 per cent. Sodium Chloride Solution at the time of use. **Sterules** of this **Salt Solution** are made.

Dose.—Suggested 5 Cc. = 0·00125 Gm. ($\frac{1}{50}$ grain approx.) increased intramuscularly or intravenously.

Uses.—See Therapy in general—*antea.*

Reference.--The Svedberg Zeit. Chem Ind. Kolloid 1909, ii./389; J.C.S.A.; ii./1910,108.

Iodine. (*Non-Metal.*)

Colloid Iodine Sol 1 in 2,000.—*Martindale.*

Manufacture. — After experimenting we devised the following :—

Dissolve Sodium Iodide and Hydrochloric Acid (*Off.*) of each 1·18 Gm. in 3% Glucose Solution 250 Cc.

Dissolve further Sodium Nitrite 0·543 Gm. in 250 Cc. of the same strength Glucose Solution. Add this solution to the former. Finally dilute the liquid to 2,000 Cc. with 3% Glucose Solution.

The interaction is :

$$NaNO_2 + NaI + 2HCl = 2NaCl + NO + I + H_2O$$

The Nitric Oxide is removed. The Iodine is in a nascent active condition.

It will be observed that the amount of Sodium Chloride present is practically 0·045%, *i.e.* $\frac{1}{20}$ approx. of that of Normal Physiological Saline.

Protective.—We have experimented with other protectives but Glucose offers the best properties.

Tests.—To 5 Cc. of a Colloidal Iodine preparation in a test tube add ½ Cc. Carbon Bisulphide or Chloroform, shake and allow to separate. The solvent will be of a fairly deep violet colour, which is not increased by adding a little Sodium Nitrite and Hydrochloric Acid, showing that all the Iodine is in the free condition.

***Collosol** (T.M. 350478) **Iodine** is supplied in liquid and paste, ointment and oily form.

Dose.—1 to 4 drachms (**4 to 15 Cc.**) twice or thrice daily after meals. Intravenously 10 to 200 Cc.

Description.—A light yellow slightly viscid liquid with slightly acid reaction.

As to the liquid form, it is stated that though at least 85% of an iodide is excreted in 24 hours in the case of this preparation, the whole of the Iodine is absorbed in molecular combination with protein to form an iodo-amino-acid and eventually reaches the blood stream and exerts a reducing action on lipoids producing an alterative effect.

Bactericidal Power.—Only slight.

Uses.—As a substitute for alkaline Iodides, *e.g.*, in syphilis, rheumatic affections, tuberculosis, bronchial and nasal catarrh.

For rheumatic affections the preparation is advised by ionto-phoresis. Collosol Sulphur to be given internally. For catarrh, the effect is to render mucous secretion more fluid and less adherent to the membranes.

Intravenously as much as 300 Cc. have been injected with impunity in cases of pyæmia and also to produce softening of fibrous tissue.

References.—Eczema effectually treated by Collosol Iodine. Also bad chilblains (oil form employed), and for internal use in the later stages of syphilis, as symptoms of iodism are not produced. Dhobie's itch cleared up quickly under the preparation (oil form).—Sir M. Morris, B.M.J. i./17,617.

Pasta Collosol Iodine (PASTE FORM) with Glycogelatin basis for local use only.

For long standing ulcers effect is rapid. It is suggested to apply alternately with the similar preparation Pasta Collosol Argentum for bactericidal effect. The *oil form* (3%) and *ointment* are used for chilblains and ulceration.

Iron.—It is a difficult matter to produce a stable Hydrosol of Iron by Chemical means.

Manganese.

Colloid Sol Manganese.—*Martindale,* 1 in 400.

We have prepared this on the following lines:—

1. Dissolve Manganese Chloride ($MnCl_2 + 4H_2O$) 1·8 Gm. in Glucose Solution 3% 100 Cc.

2. Mix N/1 Sodium Hydrate Solution 18 Cc. with Glucose 3 Gm. and add Distilled Water to 100 Cc.

The Sodium Chloride Content is 0·53%.

Filter each solution if necessary and add 0·5% Phenol to each.

For use mix equal quantities of the two solutions.

PHYSIOLOGICAL EXPERIMENTS.

Subcutaneously in rats 1 Cc. of combined solution given on two consecutive days produced only slight malaise and the animal recovered completely.

Intramuscularly in cats under observation three weeks 2 Cc. doses of combined solution at weekly intervals were followed by loss of appetite. There was, however, complete recovery. Effects in man should be carefully watched before giving large or frequent doses. It has not, however, appeared in these experiments that 2 Cc. doses would be dangerous for man unless prematurely repeated.—May 11/20.

***Collosol Manganese** is supplied in two solutions to be mixed at the time of use producing a 0·25% solution. Furunculosis treated by injections of 0·5 Cc. mixed solutions and 1 to 2 Cc. of the older preparation—intramuscularly.—Sir M. Morris, B.M.J. i./18,446.

Gonorrhœa and sequelæ also eczema, acne and quinsy, have been treated by it—(*c.f.* Pallamine).

Gonorrhœal ophthalmia treated by Colloidal Manganese 1 Cc. intramuscularly, repeated, with success.—D. M. Livingstone, B.M.J. i./19,404. Boils cured by Collosol Manganese.—B.M.J. ii./18,160.

Manganese from chimney fumes has caused poisoning.—J. Gairdner, L. ii./18,434.

Manganese appears to act as a peroxidase; in the colloidal form (Collosol) it is practically non-toxic.—L. ii./18,474.

Antral and other suppuration treated by injections into subcutaneous tissues, intermuscular septa or the periosseous tissues.—E. Watson Williams, Pr. May, 1920.

Mercury.—We have experimented on the reduction of Mercurous Nitrate by Stannous Chloride with a view to obtaining a Colloidal Solution, using albumen as protective.

We discarded it as we obtained very much better results by reducing Mercuric Chloride with Hydrazine and employing Gelatin as protective. Dialyse subsequently and adjust to 1 in 2,000.

Physiological Report.

Rabbit wt. 2·0 *kg.* injected (intravenously on successive days) with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for apparent dyspnœa after the 5 Cc. dose.

Sterules of Colloidal Mercury Solution are prepared containing 5 Cc. of 1 in 2,000 Solution=0·0025 Gm. (1/25 grain) Colloidal Mercury. To be isotonised at the time of injection by 1 Cc. of 5·5% Sodium Chloride Solution.

Dose.—Suggested 5 Cc.=0·0025 Gm. ($\frac{1}{25}$ grain) intramuscularly or intravenously.

Uses.—In syphilitic affections; see also Therapy in general—*antea*, and **Collosol Hydrargyrum,** *postea,* under Collosol Argentum.

Sterules of Colloidal Mercury 0·001 Gm. with Colloidal Sulphur 0·001 or 0·00033 Gm.

Mercury and sulphur Treatment in syphilis. The addition of sulphur increases the tolerance of the patient to mercury, patients suffering, *e.g.* with stomatitis, intestinal disturbance, and even vomiting and mucorrhœa from 0·01 Gm. doses of the biniodide or cyanide tolerate same when daily sulphur injections are added. The contents of a Sterule diluted to 12 or more Cc. is injected into the gluteal muscles or into a vein of the arm. Reports of 500 intravenous and 1500 intramuscular injections of this type with good effect. The intravenous injections are the more active and may at first cause a febrile reaction with restlessness and headache; this reaction varies according to the amount of sulphur used. The Wassermann reaction was rendered negative in 86 out of 121 cases. Effective in previously rebellious lesions of the lips, mouth and genitalia, in leucoplakia, in keratitis and iritis, in joint involvements and in syphilitic arteritis and nephritis. Under arteritis are classed 7 cases of cerebral arteritis with paretic disturbances, vertigo or headache, and six cases of aortitis. In 6 out of 10 cases syphilitic albuminura disappeared under the treatment. In several instances mercury biniodide and benzoate and arsenobenzol had previously failed.—M. Loeper, A. Bergeron and K. Vahram Bull. et Mem. Société Médic. deos Hôpitaux de Paris, Feb. 8th, 1917.

Palladium, Colloidal Palladium. *Syn.* **Pallamine.**

Colloidal Manganese is most efficacious in gonorrhœa in the acute stage, but as there is delay after injecting it before its maximum oxidising power is reached, Palladium has been suggested to precede. This would instantly dissociate certain hydrogen and OH groups in the system. Palladium has the action of liberating the OH group from H.OH and temporarily fixing the H group.

☞ Potassium Nitrate and Methylene Blue are given on the theory that the liberated hydrogen can be used by reducing the former to a nitrite and the latter to its leuco base, two products less irritating than hydrogen. When Potassium Nitrate is being given eliminate Sodium Chloride from the diet as far as possible.—J. E. R. Mac Donagh, B.M.J. ii./18,31.

Epilepsy well treated by Pallamine. ½ Cc. doses intramuscularly at 3 day intervals.—A. C. King-Turner, B.M.J. ii./18,255.

Platinum.—This Colloidal Solution we found best prepared chemically by reducing a Platinous Salt, *e.g.*, Chloro-Platinite of Potash of commerce with Hydrazine in the presence of Gelatin as protective. A Colloidal Solution made in this way after previous dialysis can be adjusted to strength 1 in 4,000 (0·025%).

Physiological Report.

Rabbit wt. 2·3 *kg.* injected intravenously, on successive days, with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 9 Cc.

Result.—Well tolerated except for slight dyspnœa after the largest dose.

Sterules of Colloidal Platinum containing 5 Cc. of 0·025% Solution are prepared=0·00125 Gm., Platinum (1/50 grain). May be isotonised for use with 1 Cc. of 5·5% Sodium Chloride.

Dose.—Suggested, 5 Cc.=0·00125 Gm. ($\frac{1}{50}$ grain) intramuscularly or intravenously.

Uses.—See Therapy in general—*antea.*

Intravenously 3 to 7 Cc. Colloidal Platinum caused a rigour in ½ hour followed by rise in temperature to 104 or 105° F. with perspiration, sickness and headache. Temperature then fell to subnormal—this reaction occurred both in normal subjects and those suffering from diseases characterised by moderate pyrexia—namely subacute pleuritic and pneumonic conditions and protacted paratyphoid fever—the fall of temperature coincided with a great improvement in the general condition to a great extent—results attributed to a great extent to the Peptone 0·4% used as protective.—A. G. Auld B.M.J. i./18,195.

Selenium.—

Manufacture.—An Alkali Selenide is treated with Acid in presence of protective Colloid. The Colloidal Solution is to be isotonised with Saline at the time of use, to render it approximately isotonic with the blood.

Physiological Report.

Rabbit wt. 2·1 *kg.* injected intravenously, on successive days, with 2 Cc., 3 Cc., 4 Cc., 5 Cc., and 7·5 Cc., respectively.

Result.—Tolerated without ill effect. Selenium was also administered to the rabbit which had previously been injected with **Colloidal Gold,** *vide antea.*

Sterules of Colloidal Selenium are prepared containing 5 Cc. ot 1 in 5,000 Solution=0·001 Gm. (1/64 grain) Selenium. The Solution may be approximately isotonised by adding 1 Cc. of 5·5% Sodium Chloride Solution at the time of use. **Sterules of this Concentrated Saline** are prepared.

Dose—Suggested, 1 to 5 Cc. hypodermically, intramuscularly, or intravenously.

☞ *Uses.*—Has been suggested for use in malignant disease—see also Therapy in general—*antea.*

A preparation of colloidal selenium was tried on mice and rats with grafted malignant growths, but without effect. This preparation was non-toxic whereas that of Wassermann (Selenium and Eosin) is described as being highly toxic. Other compounds of selenium and eosin, found by experiment to be toxic, were tried, but none of these had any selective action on the tumour cells.—C. E. Walker, Lancet, May 18/1912, p. 1337.

Collosol Selenium effected diminution of pain used intramuscularly and intravenously—E. Watson-Williams, B.M.J. ii/19, 463,516.

Silver.

We obtained a satisfactory *Colloid Silver Solution* by a slight modification of Carey Lea's process—which is briefly as follows:—

Mix 250 Cc. of 30% Ferrous Sulphate Solution with a Solution of 140 Gm. Sodium Citrate in 250 Cc. of Water. Pour this mixture into 250 Cc. of 10% Silver Nitrate Solution with continual stirring. Wash by decanting with Sodium Citrate Solution 5%, dissolve precipitate in Water, and precipitate again with Sodium Citrate (twice), until it is practically free from Iron. In this manner a dark grey Colloidal Solution of strength 1% is prepared, which must contain protective Colloid. The preparation is finally adjusted to the strength 1 in 2,000 for therapeutic use.

As an alternative it is stated that well washed Silver Oxide may be reduced by a rapidly stirred 60% Formalin.—A. Pickles, Chem. News, 1918, 117, 358. Y.B.P. 1919, 109.

Physiological Report on our Preparation.

Rabbit wt. 1·85 *kg.* injected intravenously, on successive days, with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for slight dyspnœa after largest dose.

Sterules of Colloidal Silver containing 5 Cc. of 1 in 2,000 Solution are prepared. To be isotonised with 1 Cc. of 5·5% Sodium Chloride Solution.

Dose.—Suggested, 5 Cc. = 0·0025 Gm. ($\frac{1}{25}$ grain) intramuscularly or intravenously.

Uses.—In gonorrhœa and cystitis *c.f.* also Therapy in general —*antea.*

Collosol Argentum (1 in 2,000)—(H. Crookes).

Dose.—*Hypodermically* 15 or 30 minims (**1 or 2 Cc.**). *Per os*—One drachm (**3·5 Cc.**) (on an empty stomach as it inhibits digestion). Gargle.—One part diluted with three of Water. (Dilution is necessary on account of frothing of Collosols.) Eye Drops.—A few drops instilled between the eyelids or as douche diluted with 3 times quantity of water. *Locally.*—Undiluted or diluted with 3 to 4 parts of Saline Solution (1%), and in any quantity as a swab or lotion.

It is chemically prepared. Precipitation by the blood does not occur immediately on hypodermic or intravenous injection.

Uses.—Intended for use by hypodermic injection or for giving by the mouth, and to be alterative and antiseptic.

For septic and infective wounds, gonorrhœa (et sequelæ), cystitis, dysentery, hæmorrhoids, and nose, ear, eye, mouth and skin infections. Pyorrhœa alveolaris has been treated by 2 to 3 minim injections into the sockets of the teeth. Whooping cough has been treated by spraying.

Bactericidal power. Destructive to the *meningococcus,* also anthrax and typhoid organisms. After 2 Cc. and subsequently 3 Cc. injections intravenously in rabbits the particles could be found in the cerebro-spinal fluid, brain and urine.

Collosol Argentum 20 Cc., intravenously every 48 hours, given without untoward effect.—T. H. Sanderson-Wells, L. i./18,258.

It is stated that the electrically prepared suspensions differ in being precipitated by Sodium Chloride in dilute solution.

Experimental injections of 1 to 2 Cc. gave little or no local or general symptoms. Results in practice are as follows:—Successfully treated were *topically*—Septic and follicular tonsillitis, Vincent's angina, phlyctenular conjunctivitis, gonorrhœal conjunctivitis, spring catarrh, impetigo contagiosum, acne of face and body, septic ulcers of legs, ringworm of body, tinea versicolor. Soft sores, suppurative appendicitis after operation (the wounds cleaned rapidly). Pustular eczema of scalp and pubes, chronic eczema of external meatus of ear with recurrent boils, also chronic eczema of anterior nares. Offensive discharge in case of chronic suppuration in otitis media, bromidrosis of feet and axillæ. Blind boils of neck. *By injection*—Gonorrhœa and chronic cystitis (local), boils, epididymitis.—C. E. A. Macleod. L. i./12.322.

Sprue treated by 1 to 2 or more drachms three or four times *p.d.* Improves the condition of the motions. Effectual when temperature was over 101° F. and death anticipated.—J. Cantlie, B.M.J. ii./13,1297.

Pyorrhoea cured by 15 minims of Collosol Argentum hypodermically in the arm. Corneal ulcer with acute inflammation disappeared by 2 drops in the eye. Septic diarrhœa following intestinal obstruction and successful removal of appendix stopped by 20 minims hypodermically. Useful as nose spray for post nasal catarrh and for simple nasal catarrh. Abscess on the hand due to bullet wound well treated.—A. H. Boys, B.M.J. ii./16,586,924.

Pasta Collosol Argentum is also made for use to wounds, burns, skin affections, chilblains and hæmorrhoids. Acne has been well treated.

Collosol Hydrargyrum is of similar strength, dose and properties.

The preparations kill *B. Coli, B. Tuberculosis, Gonococcus, Staphylococcus, Streptococcus,* etc., in a few minutes. Non-toxic to the human organism, non-irritant in wounds and operative work,—promotes a quick healing in cuts and sores.—B.M.J. i./12,520.

Collosol Silver and Mercury have considerable antiseptic action but little bactericidal. The experiments for the antiseptic action were done by adding the Test organism to the preparation or its dilution and then after 5, 10, etc. minutes, broth was inoculated. For the *bactericidal* effect the preparation was added to the nutrient medium and then inoculated with the organism.—Prof. C. R. Marshall & G. B. Killoh, B.M.J. i./15,102.

Sulphur.—We have prepared a 1 in 1,000 opalescent Colloidal Sulphur Solution by decomposition of a mixture of Sodium Sulphide and Sodium Sulphite with Acid in the presence of protective Colloid.

Sterules containing 2 Cc. of 1 in 1,000 Solution isotonised at the time of use with 0·4 Cc. of 5·5% Saline. *Dose suggested,* 1 to 5 Cc. (=0·001 to 0·005 Gm.).

Suggested for use in skin affections and wherever Sulphur is indicated through excessive elimination.

Sulphur Collosol (1%).

Dose.—Per os 2 to 4 drachms (8 to 15 Cc.) in a wineglass of water twice daily during or after principal meals. Subcutaneously or intravenously, 1 to 2 Cc.

Uses.—Colloidal Sulphur it is claimed is a very active form of sulphur which readily combines with protein and is entirely absorbed in the stomach. Rheumatic affections much relieved. **Colossol Sulphur Cream** to be used with it by gentle massage is also prepared. An *Oil* for the Scalp is also made. Also a variety for *baths* and external use and for *injection.*

Collosol Sulphur beneficial in acne, acne rosacea and seborrhœa. Baths for relief of generalised, acute psoriasis and painful fibrositis.—Sir Malcolm Morris, B.M.J. i./17,617.

The ✱ "**Oscol**" (T.M. 305256) brand of Colloids includes Silver, Copper, Mercury, Iron, Iodine and Sulphur.

Oscol **Silver** has been used in gonorrhœa, phthisis, pneumonia, bronchitis, pyorrhœa alveolaris, hay fever, septic conditions of the nose, wounds, throat, ear, cystitis and acne. Oscol **Copper** in cancer. Oscol **Mercury** in syphilis and tonsillitis. Oscol **Ferrum** in chlorosis and debilitated conditions. Oscol **Iodine** in all cases where this halogen is indicated. Oscol **Sulphur** in rheumatic affections.

(2) ELECTRICALLY PRODUCED.

General Directions.—

With regard to making these Colloidal Solutions electrically by working from the main our experience is that the intensity of current necessary is considerable—the ordinary wiring for lighting is not sufficient. Special wiring is required as in the case of a power circuit. With this latter, resistance can be introduced so as to adjust the intensity to about 8 ampères. The intensity necessary varies with the type of metal which it is desired to convert into the colloidal condition.

Pure Distilled Water must be used and the electrodes must be so arranged as to produce a uniform arc beneath the surface. After sparking for a sufficient length of time the solution is to be standardised.

Antimony, Colloidal made by sparking from an induction coil through antimony under chloroform. Possesses trypanocidal properties.—U. N. Brahmachari, L.ii./16,728. I. Med. Gaz., May, 1916. See also Antimony Colloidal chemically produced.

Copper.

Working on the lines of our general directions above we were not successful with a pure Colloidal Copper Solution. We prefer the **Chemical Method** for this element. *q.v.*

Electrocuprol.

Dose.—1 to 20 Cc. intravenously, isotonised by mixing with Saline (supplied) at the time.

A brown solution described as a Colloidal Solution of Copper Oxide containing 0·15% Copper. Ampoules 5 and 10 Cc. are prepared.

Uses.—In cancerous diseases and tuberculosis.

Cancer treated by Colloidal Copper made by Bredig's method. Intravenous injections of 300 to 400 Cc. warmed to body temperature. About 2 to 4 hours after an injection hyperæmia is noticed in the tissue adjoining the tumour, which if open produces increased secretion. After about 15 injections the increased hyperæmia and sensitiveness disappear and discharges decrease. Retrogression of tumour.—Loeb, McClurg, and Sweek (Barnard Skin Hosp., St. Louis, Mo.), Interstate Med. Jl., Dec. '12, and Jan. '13; Am. Jl. Ph April '13; B.M.J. i./13,255. In some varieties of cancer colloid copper seems to have specific action.—M.P.C. i./14,377.

Colloidal Copper made by Bredig's method. Galvanic current of 10 ampères passing between two thick copper electrodes in a beaker of Distilled Water free from CO_2 in a larger vessel containing *ice*. Content 0·04 to 0·3% Cu. 1 Cc. injections into tumour mice to some extent promising.—B.M.J. ii./13,222.

Gold.—We have prepared Colloidal Gold Solution electrically as described under general directions, the product being of a dark bluish purple colour. **Sterules** 5 and 10 Cc., are prepared 1 in 4,000 strength, to be isotonised at time of use with 1 and 2 Cc. respectively of 5·5% Sodium Chloride Solution.

Uses.—*Vide* Therapy in general—*antea.*

Electraurol.—

Dose.—5 to 20 Cc. intravenously or intramuscularly.

An electrically prepared protected Colloidal Solution of gold of violet colour containing 0·025% metal.

(*Note.*—This violet solution of gold would indicate that the particles are both + and − charged, *c.f.* Morris-Airey and J. H. Long, *antea.*)

Uses.—In articular rheumatism, typhoid and complications.

Infected wounds treated by intravenous injections of 2 to 6 Cc. and 50 Cc. (?) intramuscularly or subcutaneously into the peripheral zone of the infected wound. Intravenously the reaction is so violent that in some cases there is tendency to collapse—above dose said to be free from danger. Good results in extensive injuries infected with anaerobic organisms.—B.M.J.E. ii./15,1.

Iodeol.—An electrically prepared Colloidal Oily Iodine Solution containing 0·2 Gm. of Iodine per tube of 1 Cc.—a dose by intramuscular injection. Has been used in pulmonary and rheumatic affections.

It is stated that 10 minutes after " application upon the skin " Iodine can be found in the urine.

Capsules containing 0·25 Gm. Iodine and **Ovules** are prepared.

Iodargol is similar, containing 0·4 Gm. of Iodine per tube. Stated to be a non-toxic, painless solution for injection by means of an urethral syringe in gonorrhœa and allied infections.

Tetanus treated by daily intramuscular injections of colloidal iodine (20% oily suspension) and in form of dressings in conjunction with Antitetanus serum. It possibly inhanced the action of the latter.—Auregan, L. ii./15,430.

Iron.—The general directions are not applicable in this case, hydroxide of iron being the only product; we doubt if it is possible to prepare a true metallic iron colloid in an aqueous medium—the element being so easily oxidised.

Mercury.—

Our experiments showed that the electrically prepared colloid is difficult to obtain and not more satisfactory than the *chemically prepared* product. *q.v.*

Electro-Hydrargyrum, a grey solution, stated to be electrically prepared.

Dose, average.—3 Cc. per day (rendered isotonic with Saline at the time of injection). Single doses up to 6 Cc. have been used.

Ampoules containing 5 Cc. of 0·1% of Mercury Solution to be isotonised at time of use are supplied.

Uses.—In syphilis, tabes (intraspinal injections), locomotor ataxy, and chronic meningo-myelitis.

Electroplatinol.—Grey in colour; and **Electropalladiol.**—Greyish brown in colour. Used similarly to Electrargol.

The Platinum preparation (content 0·025%) has been tried in pneumococcal meningitis and pulmonary tuberculosis and in obesity.

Selenium.—

With regard to this element our experience was that the electrical method is unsuccessful. On the other hand the **Chemical Process** of manufacture is one to which we devoted considerable attention.

Electroselenium (Erythroselenium) is stated to be electrically prepared.

Dose.—2 to 10 Cc. intravenously daily or every other day commencing with 2 to 3 Cc. and increasing according to reaction and sensitiveness of the patient.

A dichroic red solution, isotonic and containing 0·02% Colloidal Selenium with added protective. Ampoules contain 5 Cc. It is said to be less toxic than the mineral compounds of Selenium. Claimed to be bactericidal *in vivo* but only feebly germicidal *in vitro.*

Uses.—The palliative treatment of cancer.

Seleniol.—An electrolytic colloid of Selenium. Mixed cell sarcoma of the tonsil and deep glands and another case—extensive fungating growth of the larynx, causing obstruction. 3 Cc. doses thrice weekly into the tissues close to the thyroid cartilage. General improvement.—L. i./13,612.

Silver.—

With this element we found the disruption of Colloidal particles proceeded with ease and a satisfactory 1 in 2,000 Solution can be made.

Dose.—5 to 10 Cc. isotonised with 1 and 2 Cc. of 5·5% Sodium Chloride Solution.

Uses.—In venereal affections,also in other infective diseases *c.f.* Therapy in General. **Sterules of Electric Colloidal Silver** 5 and 10 Cc. are prepared.

✱**Electrargol** (T.M. 351388).—A reddish brown solution ('stabilised') containing 0·025% of Silver.

Dose.—1 to 10 Cc. intramuscularly, after rendering isotonic with saline (supplied). Ampoules 5, 10 and 25 Cc.

Uses.—In diseases of the genito-urinary organs and infective diseases in general. Intrapleural Injections of 15 to 50 Cc. have been made in pleurisy.

Employed hypodermically claimed to arrest septic infective processes—puerperal infection, etc.—B.M.J. i./12,252. Electrargol and allied Colloids stated to be absolutely innocuous.—L. i./12,89,322,684,1344. Smallpox treated with Electrargol. 20 Cc. intravenous injections.—B.M.J. ii./13,906; i./14,1236. In measles.—L. i./14,49. In plague.—B.M.J. i./14,1236.

In erysipelas Colloidal Silver has been found of real service.—M.P.C. i./14, 377.

F. Antiseptic Powers of Colloidal Solutions. *See Antiseptic Powers, Vol. II.*, 'Colloidals.'

G. Metal Organosols.—

If Lanolin, impregnated with an aqueous solution of the salt of a heavy metal, is triturated with a solution of alkali Hydroxide, double decomposition occurs and the Oxides or Hydroxides of the heavy metals are obtained as Colloids. If readily reduced the Oxides may thus produce the Colloidal Metals. After removing the water and electrolytes present the residue will dissolve in all organic solvents in which Lanolin is soluble. By evaporating the solvent, solid colloidal products with high metal content are obtained. The protective action of the Lanolin is possessed in a still more marked degree by the Lanolin Alcohols (*e.g.*, Cholesterol). By the use of the unsaponifiable wool-fat residue a still higher percentage of metal can be obtained. Details are given *re* **Silver Organosols** made by this method.—C. Amberger (Zeit. Chem. Ind. Kolloide, 1912,11,97—100), J.C.S.A. ii./12,1053.

Gold Organosol has also been made by this method.

Complete reduction of the initially precipitated Oxide is effected by Hydrazine Hydrate. The product containing Lanolin as protective dissolves in Ether, Petroleum Ether, Fats and Liquid Paraffin, giving deep blue solutions. Chloroform gives reddish violet solution. By precipitating the Solution in Petroleum Ether with Alcohol, a pasty product containing a considerable amount of Gold is obtained. It can be dried, forming granular masses soluble in Liquid Paraffin and Chloroform, but only slightly in Petroleum Ether and Ethyl Ether.—J.C.S.A. ii./12,1059.

'Lanosol' Silver.

We repeated these experiments so far as Silver is concerned using 100 Gm. Anhydrous Lanolin, 30 Cc. 5% Silver Nitrate, 30 Cc. Water with 3 Cc. 10% Ammonia and 30 Cc. Water with 2 Gm. Hydroxylamine Sulphate. The yield by precipitating the Petroleum Ether Solution with Spirit (4 volumes) was 40 Gm. It formed a brown pasty mass containing less than 0·5% Silver. Theory would be approximately 2·25% Silver.

For Colloids and Crystalloids in relation to the constitution of the body and physiological processes, *c.f.* Iontophoresis Vol. II.

H.—GENERAL REFERENCES.

For the *physical conditions* of Colloids a number of papers are indexed in the Chem. Soc Index, 1903—1912.

Hydrogels, Hydrosols, and Organosols.—Lottermoser, J.C.S.A ii./07,78, 464,851.

Theory of Colloids.—Jacques Duclaux, J.C.S.A. ii./1910,108.

Fish Bladder Membrane more effective than parchment and Collodion for dialysing Silica.—J.C.S.A. ii./1910,942.

Ultra Microscopic Investigations.—Wiegner, J.C.S.A. 1911, ii./591.

The relationship of Albumin to Inorganic Colloids and to the salts of the heavy metals is dealt with in a thorough manner by W. Pauli and L. Flecker. —Biochem. Zeit. 1912,41,461,512. *See* J.C.S.A. i./1912,668.

Classification of Colloids.—Much discussion has taken place on this subject. For further refs. *see* J.C.S.A. ii./1912,337,439.

Electric Charges on Colloidal Particles. When a Colloid is dissolved in an Electrolyte, *e.g.*, Colloidal Ferric Hydroxide in Ferric Chloride Solution, the Colloid and Electrolyte form a labile complex-stable in excess of the electrolyte.—J.C.S.A. ii./1912,542.

Surface Tension and coagulation of Colloidal Systems. Theory of action of Poisons, Drugs and Dyes.—J.C.S.A. ii./12,740.

Unprotected Metallic Colloids cause more or less hæmolysis both *in vivo* and *in vitro*. This is, however, entirely obviated by the use of protected sols, which can be diluted with Saline so as to make them isotonic.—Lyn. Dimond, Pr. July, '13,132.

Colloid state of Matter.—Na. Feb. 1911,530.

For a useful résumé of the entire subject *vide* B.M.J. i./12,252.

A treatise on the therapeutic use of Colloidal Metals —Pres. May, 1912. *See also* Organic Chemistry, by Howard D. Haskins (Chapman & Hall).

Colloidal Metals. Successes with.—B.M.J. i./14,1016

Colloidal Solutions.—P.J. i./14,109.

Colloids and their use in Medicine.—R. Cecil Owen, P.J. i./20,497.

COLOCYNTHIDIS PULPA (*Off.*).

Bitter Apple.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

The dried pulp or pith of the fruit of *Citrullus Colocynthis* (*Cucurbitaceæ*) freed from the seeds. Has a markedly bitter taste, is free from starch, and contains only about 3% fixed oil or less (2% *Off.* and U.S. IX.) whereas the seeds contain 15% or more. Is imported from Smyrna (the best) and Spain. According to U.S. IX must not contain more than 5% of seeds, nor more than 15% of ash.

Antidotes.—Spirit of Camphor 10 drops on sugar or in milk every ¼ hour, Laudanum 30 minims (by rectal injection if not able to swallow). Stimulants, demulcent drinks, apply warmth.—Murrell.

Colocynth Poisoning. A teaspoonful and a half proved fatal.

A woman took 75 grains in powder. Vomiting and diarrhœa persisted for some hours. Treatment was Arrowroot, Morphine and Atropine. After two days Chloretone in Olive Oil every six hours and a purely milk diet. Ultimate recovery. There was little abdominal pain throughout. Literature shows that nearly all cases where doses of 110 grains and over have been taken have ended fatally. Gastro-intestinal symptoms in such cases are most marked, leading to rapid collapse.—R. B. Roe, L. i./13,1527.

Uses.—A drastic cathartic. A frequent ingredient in aperient pills. For formulæ *see* Index, "Pills."

Extractum Colocynthidis Compositum (*Off.*).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

This is now *powder form*, made by extraction of Colocynth Pulp, and adding Extract of Aloes, Scammony Resin, Curd Soap in powder and powdered Cardamom Seeds.

U S. has Aloes 50, Colocynth Extract 16, Soap 15, Scammony Resin 14, Cardamom 5. In fine powder.

Extractum Colocynthidis. U.S. IX. *Average dose,* ¼ grain. Made with Diluted Alcohol from seed-free pulp, reducing the extract to powder and diluting with starch so that 1 of extract equals 4 of drug. Colocynth yields about 40 or 50% to alcohol.—Caspari.

Pilula Colocynthidis Composita (*Off.*).

Dose.—4 to 8 grains (**0·2 to 0·5 Gm.**).

Contains Colocynth Pulp, Aloes, Scammony Resin, Potassium Sulphate, and Oil of Cloves with Water *q.s.*

Pulvis pro Pilula Colocynthidis Composita consists of the ingredients of the pill less the water. Is more convenient for dispensing.

Ⓟ **Pilula Colocynthidis et Hyoscyami** (*Off.*)

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Compound Colocynth Pill 2, Hyoscyamus Extract 1, with Water *q.s.*

Hamilton's Pill.

Compound Extract of Colocynth 2, Hyoscyamus Extract 1. Made into 4 grain pills. This is stated to be less griping than the last mentioned.

Tinctura Colocynthidis, P.G.V.

Dose.—3 to 15 minims (**0·2 to 1 Cc.**). (Maximum single dose, 1 Gm.; maximum daily dose, 3·0 Gm.). Strength 1 in 10 alcohol (90%).

Constituents of Colocynth.—L. i./10,662; C.D. i./10,150.

Colocynthin. $C_{56}H_{84}O_{23} = 1124·952$ The active principle, a glucoside, of Colocynth in the form of an amorphous yellow powder. Has been employed as a hypodermic purgative.

Dose.—15 minims of a 1% solution in Glycerin, approximately ⅙ gr.

It occurs to the extent of 0·6%. It readily reduces Fehling's Solution and is split up on hydrolysis.—Y.B.P. 1913,127.

Cucumis trigonus (*C. pseudo-colocynthis*, Royle). Common in the Bombay Presidency, contains colocynthin or body closely allied.—Naylor, P.J. ii./07,117.

CONIUM.

Hemlock.

French—Ciguë. *German*—Gefleckter Schierling.

Both the dried unripe fruits and the fresh leaves and young branches of *Conium maculatum* (*Umbelliferæ*), collected when the fruit begins to form were in B.P. '98.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**). U.S. VIII. Standard 0·5% conine. (Conium is now removed from U.S.P.) Fr. Cx.—*Max. single dose* 4 grains, max. during 24 hours 12 grains approximately.

Conium fruit contains 0·36 to 0·91% of Conine. A standard of 0·5% is suggested.—P.J. i./04,5. The fruit contains more than the leaves.

For further chemical details on Conium, see Vol. II.

P1 **Coninæ Hydrochloridum.** Silky needles soluble 1 in 4 in water.

P1 **Coninæ Hydrobromidum.** Fr. Cx.
$C_8H_{17}N.HBr=208·114$.

Dose.—⅓ grain, increased to 2 grains (**0·02 to 0·12 Gm.**) in pill.

The hydrobromide of the liquid alkaloid P1 **Conine** (*α-n* Propylpiperidine) *Syn.* **Coniine, Cicutine** $C_8H_{17}N=127·186$. It was synthesised by Ladenburg. The base is soluble in alcohol, 1 in 80 of water, also in chloroform and acetone. *Dose.*—Similar to that of the salt which is in colourless crystalline prisms, soluble in water 1 in 2, nearly.

Incompatibility.—Conium preparations are incompatible with alkalis and preparations containing tannin.

Antidotes.—Stomach tube and emetic. Give tannic acid and wash out the stomach again. Stimulants are needed and employ artificial respiration.

Uses.—Conium and conine hydrobromide act as direct sedatives to the respiratory centre; in poisonous doses death is caused by asphyxia. Employed with advantage in all spasmodic affections, especially for whooping-cough and asthma; in neuralgia, epilepsy, and as a sedative in acute mania.

Ⓟ **Injectio Coninæ Hydrobromidi Hypodermica.** 1 grain in 20 minims. *Dose.*—1 to 3 minims (**0·06 to 0·2 Cc.**).

Ⓟ **Pessus Coninæ** (Hosp. for Women, Soho Square). Conine ½ minim, Gelatin Mass 20 grains.

Ⓟ **Tinctura Conii.**
Dose.—½ to 1 drachm (**2 to 4 Cc.**).

We prepare this with Conium Fruit No. 40 powder, 1 in 5 of Alcohol 60% by percolation, and standardise to 0·1% Conine as suggested.—P.J. i./04,5; ii./09,142.

Ⓟ **Extractum Conii Liquidum, B.P.C.**
Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Conium Fruit 100 in No. 40 powder is exhausted with alcohol 60% containing 1·25% of acetic acid 33%, the last portion of percolate concentrated and mixed with the first 85 previously set aside so as to produce 100 of Liquid Extract "containing alkaloids equivalent to 1% of alkaloidal hydrochlorides."

Ⓟ **Extractum Conii,** Fr. Cx. *Extrait de Ciguë, Dose.*—Maximum single ¾ grain (**0·05 Gm.**) approximately.

A firm Extract produced by extracting the powdered fruits with 70% alcohol at 35° C., evaporating the liquor and treating the residual extract with water, evaporating the aqueous extractive, rejecting the portion not dissolved. We found an extract which we made (1914) to contain 2½% alkaloids

Ⓟ **Unguentum Conii.**

The author's formula is as follows :—

Extract of Conium, Fr. Cx., a sufficiency to produce 0·1% total alkaloids in the finished Ointment, the basis of which consists of Unguentum Lanolini.

Gives relief in pruritus ani, and for painful fissures.—B.M.J.ii./08, 632.

COTO CORTEX.

Dose, in powder, 1 to 8 grains (**0·06 to 0·5 Gm.**) 4 to 6 times a day. Is imported from Bolivia. Paracoto bark is exported in place of true Coto bark—*N.O.* probably *Lauraceæ* or *Monimiaceæ*.

Uses.—For cholera, and especially the diarrhœa of phthisis, for night sweats, and for gout and rheumatism. It is rich in resins which give it a pungent taste.

To distinguish true from false Coto bark.—P.J. ii./05,580.

Incompatible with Mistura Cretæ.

Extractum Coto Liquidum. 1=1 of bark.

Dose.—2 to 6 minims (**0·12 to 0·4 Cc.**).

Tinctura Coto, B.P.C.

Coto Bark bruised 1 Alcohol (90%) *q.s.* to 10.

Dose.—10 to 30 minims every 2 hours with mucilage and syrup to suspend.

Mistura Anti-cholerica *Royal Coll. Phys.* 1892 (L. ii./92,682). Form II

Aromatic Sulphuric Acid 15 minims, Compound Tincture of Camphor 30 minims, Compound Tincture of Chloroform, Tincture of Coto, of each 20 minims, Syrup of Orange Flower 1 drachm, Peppermint Water to 1 ounce. *Dose.*—1 ounce every 3 or 4 hours. This preparation has been found invaluable. Form I. will be found in the Xth Edition, p. 105

Ⓟ **Diarrhœa and Cholera Mixture.** (*Board of Health.*)

Aromatic Confection 9 grains, Aromatic Spirit of Ammonia 9minims Tincture of Catechu 30 minims, Compound Tincture of Cardamoms 18 minims, Tincture of Opium 3 minims, Chalk Mixture to 1 ounce (=1 dose). The following (C.D.ii./07,357) are also of great benefit :—

Ⓟ **Mistura Thielemani.** *Syn.* TINCTURA ANTICHOLERICA THIELEMANI. THIELEMAN'S KOLERADRAABER.

Average Dose.—30 minims (**1·8 Cc.**). Dissolve Peppermint Oil 3 in Alcohol 22 and add to Sydenham's Laudanum (Vinum Opii Crocatum *q.v.*) 10, Ipecacuanha Wine 25, Tincture of Valerian (1 in 5 of Dilute Alcohol) 40.

Ⓟ **Tinctura Anticholerica Conradi.**—CONRAD'S KOLERADRAABER.

Dose.—Over 20 years, 40 drops : over 5 years, 1 drop for each year. Must not be given to a child under 5 years.

Tincture of Opium (B.P. '98) 1, Tincture of Cascarilla and Camphorated Spirit of Ether of each 2, Bitter Tincture of Rhubarb 5.

[**Spiritus Ætheris Camphoratus** is Camphor 3, Spirit of Ether (1 in 4) 17. **Tinctura Rhei Amara** is Rhubarb 10, Cardamoms 1, Gentian 4, Alcohol (70% by vol.) 100, all by weight.]

Pulvis Cretæ Compositus, U.S.

Average dose.—30 grains (**2 Gm.**).

Prepared Chalk 30, Acacia 20, Sugar 50.

Cotoin.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) every 2 or 3 hours in pill or diluted mucilage.

A bitter principle, in yellow crystalline powder, slightly soluble in water, soluble in alcohol. Melting point, 130° C. The dust is irritating to the nostrils. **Fortoin.**—*Syn.* METHYLENEDICOTOIN. *Dose.*—4 grains (**0·25 Gm.**) is used in dysentery.

COUMARINUM.

COUMARIC ANHYDRIDE, $C_9H_6O_2$=146·093.

A neutral crystalline principle with aromatic odour and burning taste obtained from Tonquin beans, the fruit of *Coumaruna odorata,* and is found in the Woodruff, but is made synthetically from Salicylic Aldehyde by the action of Acetic Anhydride in presence of Sodium Acetate.

Soluble in alcohol, ether and oils, but not to any extent in water. Sublimes unchanged. One part will disguise the odour of 50 of iodoform.

Vide also Acidum Coumaricum.

Ⓟ CREOSOTUM FR. CX.

Kreosotum, P.G.V., P. Austr., P. Helv., P. Dan.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), increased to 30 or even 60 minims, in capsules, or in cod liver, almond, or olive oil, or emulsified.

Soluble in alcohol, chloroform, ether, glacial acetic acid, fats and oils, and 1 in about 150 of water.

Creosote (*Off.*)—is a mixture of phenols–chiefly guaiacol and creosol. Two kinds of genuine Creosote are met with in commerce—one from **Pinewood,** which is anhydrous and mixes perfectly with oil of turpentine, consisting chiefly of creosol $C_6H_3.CH_3.OCH_3.OH$: 1, 3, 4= 138·12 homopyrocatechin-methyl-ether (Morson's Creosote is representative of this class). Glycerin is miscible with Morson's Creosote in all proportions up to 2 of Glycerin to 1 of Creosote. Upon further addition of glycerin the mixture becomes turbid. Creosote does not cause collodion to gelatinise when mixed with it in equal proportion. The other variety is principally from **Beechwood,** which contains Guaiacol, $C_6H_4.OCH_3$ OH=124·099 and is more soluble in water.

For further information as to composition of and tests for Creosote, see Vol. II.

Flavoring.—Emulsified, Glyl or Syl Pini excellent, Syl Lavandulæ and Syl Amygdalæ Amaræ are also good; Mistura Amygdalæ Composita, or Essentia Menthæ Piperitæ.

Uses.—Locally as a caustic. It is one of the most powerful deodorisers, antiputrescents, and antiseptics. It is used internally to correct fetor, given to check sickness, for diabetes, added to cod-liver oil for phthisis and applied externally in various skin diseases, and is put into the cavities of carious teeth. *Hypodermically* was administered in 10% solution in sterilised almond oil. Checks gastric fermentation and is an intestinal antiseptic in some forms of diarrhœa. For irritable trachea and congested larynx, causing troublesome cough, the inhalation of creosote from an oro-nasal or 'ozonic' inhaler is useful.

Two half drachm doses taken. Recovery with no evil after effects.—B.M.J.E. ii./92,4.

Incompatible with silver oxide (*q.v.*). Also with calcined magnesia and slaked lime.

Aqua Creosoti, U.S. *Syn.* LIQUOR CREOSOTI. *Average dose.*—2 drachms. Creosote 1 in 100 water freshly prepared.

Elixir Creosoti.—*Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted at the time of taking.

Creosote 2 minims, Alcohol 90% 10 minims, Syrup of Pine (*q.v.*) and Simple Elixir, B.P.C., 1894, *a.a. q.s.* to 2 drachms.

Haustus Creosoti (Vic. Park) contains 3 to 30 minims in an ounce dose.

Mistura Creosoti et Potassii Iodidi.

Dose.—½ ounce (15 Cc.) every three hours until the temperature becomes normal.

Creosote ½ drachm, Potassium Iodide 1 drachm, Alcohol 2 drachms, Liquid Extract of Liquorice 3 drachms, Water to 6 ounces.

In the treatment of lobar pneumonia the above dose is suitable for adults; for children proportionate quantity. The antiseptic action of creosote limits the extension of the pneumonic process. The Iodide by stimulating cell action loosens the exudate. Combined, these drugs produce quieting effect on the heart, and diuresis. The Iodide reduces blood pressure. No particular local treatment employed. Results in 20 cases good. The author of the paper puts these results against Vaccine Therapy results. Stock Vaccine may be useless, and preparation of an autogenous one may mean two days' delay.—B.M.J. ii./10,1611.

Amazing results in lobar pneumonia.—E. W. Maitland, B.M.J. ii./18,464.

Pneumonia and Influenza well treated, 10 minims gently rubbing into the right axilla with the finger repeated on the left axilla if required 10 minims at a time, also ½ minin *per os.* Reduces temperature.—J. E. B. Wells, B.M.J. i./19, 481.

Mistura Creosoti Composita.

Dose.—2 drachms every 4 hours for a child of 5 years.

Creosote 32 minims, Calcium Carbonate (precipitated) 128 grains, Potassium Iodide 16 grains, Mucilage Tragacanth *q.s.*, Saccharin 8 grains, Oil of Peppermint or Aniseed 5 minims, Water to 8 ounces.

In tuberculous peritonitis in two children, apparently hopeless cases, the above was useful. Tincture of Opium or Compound Tincture of Camphor added for relief of pain and diarrhœa if present. Petroleum Emulsion and Cod Liver Oil as further treatment. Abdominal tumours diminished and general health improved. Remarkable recoveries. The mixture has also been found very beneficial in phthisis.—H. Lawrie, B.M.J. ii./13,1433.

Oleum Morrhuæ cum Creosoto.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Contains 1½%.

In ulcerative colitis, Creosote 3 minims, with Cod Liver Oil 1 drachm thrice daily—Castor Oil having been previously given—increased by 1 drachm daily, until on the 4th day 12 minims with ½ ounce respectively are taken combined, until termination of the disorder. This treatment is superior to all others.—L. i./09,500.

✱ **Pautauberge's** (T.M. 242453) **Solution.**

A proprietary article containing Calcium Hydrochloro-Phosphate with Creosote.

Dose.—A tablespoonful (containing 2 minims of Creosote and 8 grains of the above salt).

Perles of Creosote. 1 or 3 minims in each, with oil, also **Capsules,** 3 and 5 minims, or more, with oil.

Ⓟ **Creocarb Capsules.** Contain Beechwood Creosote 3 minims and Phenol ¼ gr. In the treatment of phthisis.

Pilula Creosoti :—*Martindale.*

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

Creosote 1, Curd Soap, in powder, 1. Digested on a water-bath in a wide-mouth stoppered bottle. Japanese soldiers carry creosote as prophylactic against dysentery.—B.M.J. i./04,1327.

To make a pill containing Creosote 2 minims and Phenol 1 grain, use White Wax 2½ grains and Powdered Liquorice 1 grain. Incorporate the Phenol, Creosote and Wax with the powder gently and quickly.—P. Boa.—**P.J. ii.**/11 884.

Spiritus Creosoti.

Dose.—1 drachm. Creosote 1, Alcohol 90% 40. Lessens cough and expectoration in chronic bronchitis and phthisis.

Vaselinum Creosoti :—*Martindale.*

1 of Creosote in 10, employing "*High Melting*" Vaseline.

Unguentum Creosoti B.S.H.

Creosote 6 drachms, Yellow Wax 180 grains.

Melt, and stir till cold. Used in psoriasis. Caution.—Should not be applied to the abdomen, face, or flexor surfaces of the limbs.

Ⓟ **Vapor Creosoti,** T.H.

Creosote 80 minims, French Chalk 30 grains, Water to 1 ounce C.L.T.E. has Creosote 40 minims, Light Magnesium Carbonate 20 grains, Water to 1 ounce.

A teaspoonful in a pint of water at 140° F. Useful in chronic congestion of the larynx and trachea, and in ozœna, fetor of breath and syphilitic throats.

Abscess of lung. Creosote internally in doses up to ½ drachm, together with inhalations of Creosote and Iodine.—L. i./07,1021.

For phthisis, it is more sedative in its action if mixed with an equal volume of spirit of chloroform, 5 to 20 minims employed at one time.

Ⓟ **Vapor Creosoti Compositus** (*Syn.* Vapor Acidi Carbolici Compositus in XIVth Edition).

Creosote 2, Carbolic Acid 2, Iodine Tincture 1, Spirit of Ether 1, Spirit of Chloroform 2.

For early pulmonary tuberculosis inhalation of antiseptics from a "Burney Yeo" inhaler was recommended by Lees. *It must be continuous and in operation the whole of the 24 hours,* excepting meal times. The above solution is used: 6 to 8 drops dropped on to the sponge of the inhaler every hour during the day, and two to three times during the night if awake. Non-irritating, beneficial and does not cause hæmoptysis. Allays pyrexia and cough.

Should hæmorrhage occur, Yeo's suggestion to add turpentine should be remembered. Patient is gradually weaned from the inhalation during a few weeks, and exercise is performed. Early recognition by careful percussion combined with treatment by continuous antiseptic inhalation alone justify the hope of possibility of abolition of pulmonary phthisis.—B.M.J. ii./09,1659.

Cases of incipient or early pulmonary tuberculosis (three or four of them were very acute and rapidly advancing) previously treated—*vide* B.M.J. Dec. 11 & 25, 1909. Some of the 20 new cases are of later stage or attended with grave complications. Recovery hence must be comparatively slow, and final issue may be doubtful. Pulmonary tuberculosis ought never to be allowed to reach such a stage. It is recognisable and ought to be discovered before there is any breaking down of lung tissue.—D. B. Lees.—L. ii./10,1475.

A third series of twenty cases.—B.M.J. i./12,767.

The antiseptics make their way into the pulmonary alveoli and the slow absorption of the anæsthetic solvents in a dilute condition carry with them the antiseptics into the blood and by the blood stream to the tuberculous foci. The Alcohol used as one of the solvents must be considered as tonic and stimulating as also the Ether. The Chloroform is locally sedative and reduces cough. Menthol and Formalin appear to be too irritating and unsuited for continuous inhalation. The treatment is simple, inexpensive and can be used at home.—D. B Lees, B. M. J. ii./12,1271: ii./13,555; Pr. Aug. '12,293.

Effect remarkable, cough relieved, sputum diminished, and no further attack of hæmoptysis.—B.M.J. i./11,935; *vide* also P.R.S.M. Therap. Sec. Dec. '09, p. 17, *et seq*

A case in which constant inhalation of 5 to 20 drops at a time of a mixture of equal parts of Creosote and Spirit of Chloroform was highly beneficial.—B. Yeo, L. i./11,16.

Another communication deals with the use of Guaiacol, Phenol and Spirit of Chloroform, adding Turpentine when necessary. No drugs are taken internally and cough mixtures are unnecessary, as from the very first cough is relieved by the inhalation. Correct diagnosis is by Fowler's methods. The earliest physical signs can usually be detected in the intercostal space from one to three inches from the sternum. The initial lesion does not begin at the apices.—B.M.J. ii./10,659,1096.

In *pneumonia* at the earliest possible stages of the disease, *vide* Pneumonia.—Therapeutic Index.

Guttæ Cinnamomi Compositæ.

Creosote 2 drachms, Pine Oil 1½ drachms, Spirit of Chloroform 1½ drachms, Menthol 10 grains (or less), Cinnamon Oil 5 minims, Oil of Citronella may be added also or substituted for the Cinnamon. 10 grains of Menthol may be a little too pungent until patient gets accustomed to it. This combination used on a Yeo's respirator is not unpleasant as regards the penetrating odour of the Creosote. The inhalation has marked effect in reducing cough—a matter of the utmost importance—it rests the larynx.—Dundas Grant.—L. i./11,262.

Note.—Dr. Grant now uses 3 drachms of creosote.

Solutio Creosoti Composita, Brompton H.
Creosote 1, Spirit of Menthol (20%) 1, Spirit of Chloroform 1, for inhalation.

Creosote Carbonate.—*Syn.* ∗CREOSOTAL (T.M. 216421/1899). PATENT 19074/1890 ***Expired.*** U.S. IX.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**) or considerably increased.

A light-brown nearly odourless liquid, Sp. Gr. 1·165, insoluble in water, soluble in oils.

It contains the carbonates of guaiacol and creosol. Has been used in tuberculosis, bronchitis, and pneumonia. Breaks up in the alkaline intestinal juices.

Capsules of Creosote Carbonate contain 5 and 10 minims.

Manufacture. — Pass a sufficiency of Carbonyl Chloride into a solution of Beech Creosote 124 in Sodium Hydroxide 40 in concentrated aqueous solution. The liquor separating is washed with weak alkali and then with water.

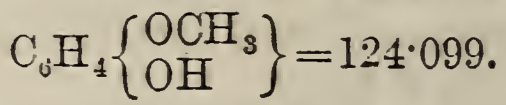
Pneumonia best treated by Creosote Carbonate 15 m. every 3 or 4 hours, Guaiacol Carbonate 5 grains better where tubercle suspected. A. Fletcher, B.M.J. i./19,799.

Creosote Valerianate.—*Syn.* EOSOTE.

Dose.—4 to 12 grains (**0·25 to 0·8 Gm.**).

An oily liquid, soluble in alcohol, glycerin and ether; checks gastric fermentation and used for phthisis epidermically. Is not so toxic or corrosive as creosote.

Capsules, each containing 7 minims, are prepared.
Proposote. *Syn.* CREOSOTE PHENYL-PROPIONATE.
Dose.—10 minims (**0·6 Cc.**).
Insoluble in water and in dilute acids, but split up in presence of alkalies. Administered shortly after meals, it passes through the stomach without causing irritation. The creosote is liberated in the intestine. Useful in tuberculosis and bronchial affections, also in intestinal bacterial infections. Capsules containing 10 minims (equivalent to 5 minims of creosote).

Guaiacol (*Off.*).  $C_6H_4\begin{cases}OCH_3\\OH\end{cases}=124{\cdot}099.$

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**). U.S. has *average dose* 8 minims. This approximates the *max. single dose* of the FR. Cx

A colourless refractive liquid, a constituent of beech-wood creosote but is also made synthetically from pyrocatechin, in colourless crystals, melting at about 28° C. Sp. Gr. 1·16 to 1·2. *The crystals should be only dispensed when so ordered.* The crystals are official in **P. Belg.**

Solubility.—Both forms are soluble in alcohol, ether, oils, glycerin, slightly in water, with taste and odour resembling creosote

Uses.—In phthisis, particularly in incipient stages, may be prescribed in capsules (Guaiacol Carbonate), or cordial, *e.g.*, Guaiacol 13·5, Tincture of Gentian 30, Alcohol (90%) 250, and Sherry to 1,000; two teaspoonsful two or three times a day in water—or in Mistura Guaiacol, *vide infra.*

Antiseptic and antipyretic. It is sometimes rubbed into or painted on the skin, covered by oiled silk; begin with 10 minims and increase to 30 or more; do not cover more than the space of the palm of a hand at a time.

Mistura Guaiacol, G.H.

Guaiacol 4 minims, Alcohol (90%) 5 minims, Glycerin 30 minims, Oil of Cinnamon 1 minim, Tragacanth Mucilage 1 drachm, Water to 1 ounce.

Mistura Guaiacol cum Quinina.

Dose.—½ drachm gradually increased to 2 drachms, well diluted with water, thrice daily after meals.

Guaiacol 30 to 40 minims, Quinine Hydrochloride 20 to 25 grains, Alcohol (90%) 2 ounces, Compound Tincture of Gentian 3 ounces, Water to 8 ounces. The small dose of Guaiacol thus given is increased by giving Guaiacol Carbonate in Capsules.—J. C. Voigt, L. i./13,607.

Pulmonary tuberculosis, highly satisfactory results with Guaiacol. Give in mixture as follows: Guaiacol 1 drachm, Alcohol (90%) 1 ounce, Syrup of Lemons 1 drachm, Spirit of Chloroform 2 drachms, Water to 6 ounces.

Dose.—½ ounce thrice daily. Increase Guaiacol by 2 minims each week until a dose of 12 to 15 minims is given thrice daily and continue for four months or more.—B.M.J. i./14,84.

Perles of Guaiacol contain 1, 2 or 3 minims, dissolved in oil. **Capsules** 2 and 5 minims, *best made with Guaiacol Carbonate* we find.

Pilula Guaiacol 1 to 3 grains (crystal) require ⅙ grain Compound Tragacanth Powder per grain of Guaiacol with Glucose Syrup to mass.

Capsules of Guaiacol (Carbonate) 1 grain, **with Iodoform** 1 grain and Almond Oil 5 minims, are prepared for use in phthisis, also of Guaiacol ¾ grain, with Cod Liver Oil, 5 minims.

Injections of Guaiacol 5%, and **Iodoform** 1%, in sterilised olive oil, have been recommended in tuberculosis; said to lessen cough and expectoration, diminish number of bacilli in sputum, favour cicatrisation of cavities, and lessen fever and night-sweats, but Guaiacol so used is not free from danger.

Dose.—One, increased to three Cc., but better *per os.*

Durant's Injection. Guaiacol 5, Iodine 1, Potassium Iodide 10, Sterile Olive Oil 100. In pulmonary phthisis.—B.M.J.E. i./04,96.

In osseous tuberculosis good results. Red blood corpuscles, hæmoglobin and globulin increased.—B.M.J.E. ii./05,28.

For tuberculous uveitis Guaiacol has been extolled. 1 Cc. of 1% Solution injected, but these subconjunctival injections are not approved by all.—A. W. Ormond, Pr. Jan. '13,267.

Vapor Guaiacol Compositus.

Guaiacol and Terebene of each 2, Menthol and Thymol of each 1, Spirit of Chloroform 3. Inhale 5 to 10 minims from an inhaler night and morning. Employed in phthisis.

Ⓟ **Fuller's Inhalant.** A.M.Ph. Assn.

Guaiacol 4, Menthol 2·5, Camphorated Tincture of Opium 125, Compound Tincture of Benzoin to 250. Sometimes with Terebene 4 added.

Unguentum Guaiacol. Guaiacol 1, Lanolin Ointment (or other suitable basis) 5, useful in orchitis and mumps. In multiple serositis of tuberculous origin.—L. i./07,1018.

Rheumatoid arthritis is well treated with Guaiacol 1, Iodine Tincture 7, to be painted on the joints twice daily with a mixture internally of Ammonium Chloride 15 grains, Iodine Tincture 5 minims, Carbolic Acid 2 grains thrice daily.—B.M.J. i./08,64.

Pigmentum Guaiacol.—Guaiacol 1, Olive Oil 1, Dissolve.

In eye diseases, *e.g.*, interstitial keratitis, irido-cyclitis, vitreous opacities sympathetic ophthalmia and optic neuritis, Guaiacol found to be more *certain diaphoretic* than Pilocarpine. Tried for reduction of temperature, but discarded owing to difficulty of limiting its action. Never used in more than 30 minim doses.—B.M.J. ii./09,418. See also Edn. XIV., p. 293.

In leprosy external and internal use of value. Used externally with a brush and covered with cotton wool or left exposed, the Guaiacol is rapidly absorbed. Pills 0·1 Gm. with Eucalyptol 0·04 Gm.—two morning and evening, gradually increased, until 10 pills (=1 Gm. Guaiacol) taken daily. Alkaline baths twice weekly, and substantial diet enjoined.—Sem. Medical, Jan. 18, 1911, per Pres.

Guaiacol Benzoas, Guaiacol Benzoate.—*Syn.* ✱BENZOSOL (TRADE MARK 97425/1890, renewed 1904; further renewal suspended). $C_6H_4.OCH_3.O.CO.C_6H_5$=228·166.

Dose.—4 to 12 grains (**0·25 to 0·8 Gm.**) in cachet.

Manufacture.—According to the patent 5366 (1890)—***now expired,*** Crude Guaiacol having a boiling point from 200° to 205° C. as it is obtained by fractional distillation from wood-tar, is converted into its salt, preferably its potassium salt, which is purified by recrystallisation from alcohol. The salt obtained in a pure state is heated with a suitable proportion of benzoyl chloride or benzoic anhydride, and the benzoyl compound is recrystallised from alcohol.

We do *not* advise the use of an alkali salt for this. In the preparation of the Potash Salt evaporation causes the substance to turn black.

We found that heating Guaiacol crystals 12, with Benzoyl Chloride 15 at 150° C. till Hydrochloric Acid ceases to evolve, then pouring into 100 Cc. of 15% solution of Sodium Carbonate gave a theoretical yield.

In small crystals, almost tasteless, nearly insoluble in water.

Incompatible with alkalis. Useful in incipient phthisis especially the diarrhœa of), and in diabetes mellitus. **Tablets,** 5 grains. *Dose.*—1 or 2.

Guaiacol Camphorate.—*Syn.* GUAICAMPHOL.

$[C_6H_4.OCH_3.O]_2(CO)_2C_8H_{14}$ or $C_{24}H_{28}O_6$=412·344.

Dose.—5 to 10 grains in cachets or 5 grain tablets.

Soluble only very slightly in alcohol, insoluble in water; for night-sweats and diarrhœa of phthisis.

Guaiacol Carbonas (*Off.*), and majority of Pharmacopœias. *Syn.* ✱DUOTAL. $(C_6H_4.OCH_3)_2CO_3$=274·187.

T.M.: DUOTAL, 19,7371/1896. (Renewed 1910.)

PATENT 19074/90, now ***Public Property.***

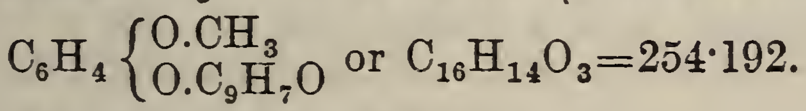
Dose.—5 to 15 grains (**0·3 to 1.0 Gm.**), gradually increased, in cachets or capsules. (The Capsules keep well). **Tablets,** 5 grains.

Manufacture.—By passing carbonyl chloride into an alkaline solution of guaiacol until the liquid on addition of Hydrochloric Acid no longer precipitates. Recrystallise from alcohol.

A white minutely crystalline substance, tasteless, and with slight odour, soluble in alcohol about 1 in 200, but soon crystallises out again with drop of temperature, insoluble in water, slightly in ether, but readily in chloroform and in benzene. Given in phthisis, improves appetite, and lessens cough, expectoration, and night sweats, also in typhoid and for bronchitis and rheumatoid arthritis.

In rheumatoid arthritis, both the subacute and chronic forms, several thousand cases treated with this salt. If administered in sufficient quantities and for a sufficiently long period, in the great majority of cases it arrests the disease and diminishes size and increases movement of joints. It relieves pain markedly. It probably inhibits growth of the specific organism in the intestinal tract, and after absorption by combining with the bacterial toxins and assisting in their elimination. At first from 5 to 10 grains in cachets thrice daily increasing by one to two grains each week until each dose is 15 to 20 grains—to be continued at least twelve months. At the same time a mixture containing 10 grains of potassium iodide in each dose; the depressing effects of the iodide should be counteracted by its combination with tonics.—A. P. Luff, Pr., Jan. 1912; B.M.J. i./13,855. Sir James Barr does not favour the method.—B.M.J. i./13,753,911. See also *ibid.*—i./13,970,1027,1028,1084,1137,1183, 1297 1298,1351.

Guaiacol Cinnamate.—*Syn.* ✱STYRACOL (T.M. 261995).



$$C_6H_4\begin{cases}O.CH_3\\O.C_9H_7O\end{cases}\text{ or }C_{16}H_{14}O_3=254{\cdot}192.$$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white granular crystals, insoluble in water. For intestinal phthisis and vesical catarrh. Said to split up into its constituents in the system.

Guaiacol Iodide.—*Dose.*—5 to 15 grains (**0·3 to 1 Gm.**). A brown powder insoluble in water, containing about 10% of Iodine as an intestinal antiseptic, etc. Suggested for use in phthisis.

Guaiacol-Salol, Guaiacol Salicylate.

$C_6H_4OCH_3.O.CO.OH.C_6H_4=244{\cdot}166$. *Dose.*—15 to 75 grains (**1 to 5 Gm.**) daily.

In white shining crystals, insoluble in water. Useful in phthisis and as an intestinal antiseptic.

Guaiacol Valerianas. *Syn.* GEOSOT.

$C_6H_4.OCH_3.O.CO.C_4H_9$ or $C_{12}H_{16}O_3=208{\cdot}188$.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**) in capsule.

Has the odour of valerianic acid. Useful in tuberculosis and chlorosis.

Capsules unfortunately do not keep well. Experiments were made with a number of different formulæ. The writer employs Guaiacol Carbonate and Valerianic Acid in chemical proportions in Almond Oil—these keep satisfactorily.

Potassium-guaiacol-sulphonate. ✱**Thiocol** (T.M. 219605).

$C_6H_3(OCH_3)OH.SO_3K=242{\cdot}251$.

Dose.—15 grains (**1 Gm.**). thrice daily. Tablets contain 5 grains: Syrup 1 drachm = 5 grains.

In odourless white crystals, soluble in water, 1 in 6, slightly in alcohol. Contains 52% of guaiacol.

Has been recommended in phthisis. Large doses may be given in bronchitis and pneumonia, also for intestinal catarrh—M.P. 1907, Sept. 18, p. 320. See also Pr., Nov. 11,699. R. Martial, Ind. Med. Rec., June, 1913.

It passes unchanged through the body.—J. M. Fortescue-Brickdale, B.M.J. i./15,107.

✱ **Sirolin** (T.M. 311971).

Dose.—3 to 4 teaspoonsful *p.d.*, children 1 to 2 teaspoonsful in 2 days. One tablespoonful is stated to be equivalent to 1 Gm. Thiocol. Employed in bronchial affections. Largely advertised on the Continent.

CUBEBA, U.S. (*Off.*)

Dose.—30 to 60 grains (**2 to 4 Gm.**) in cachets.

The dried unripe full-grown fruit of *Piper Cubeba* (*Piperaceæ*). The genuine—imported from Java—give a crimson colour with sulphuric acid, and are free from mace-like taste and odour.—P.J. 1892,771,121. (*Off.*) requires 20% of ether extractive.

The average yield of Oleo-Resin is 20%.—Umney, C.D. ii./09,579.

Cubebs, Essential Oil of, and varieties of Cubebs.—P.R. 1913,89.

Cigarettes of the powder are useful for catarrh and excessive bronchial secretion. It is sometimes added to Ferrier's Snuff, *q.v.*

Oleum Cubebæ, U.S. IX. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**). Colourless, pale green or greenish yellow oil, with camphoraceous odour and taste characteristic of Cubebs. Soluble 1 in 20 in alcohol 90%. At least 60% should distil between 250° and 280° C.

Capsules of Cubeb Oil contain 10 minims. For combinations *v.* Oleum Santali. Used in bladder and urethral affections.

Suppositoria Cubebæ, 10 grains each for astringent effect.

Tinctura Cubebæ, 1 in 5 Alcohol (90%), (*Off.*). *Dose.*—½ to 1 drachm. In chronic bronchitis as an expectorant, taken in linseed tea.—L. i./90,569.

Flavoring.—Syl Aurantii Amari, Glyl Pini; Extractum Glycyrrhizæ Liquidum.

Oleo-resina Cubebæ (B.P. 1885).

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

U.S. IX. prepares by alcohol extraction. Deposits on standing: the waxy crystalline matter is to be rejected.

Trochisci Cubebæ, T.H. Marked 'C.B.' ½ gr. each (U.S. ⅓ gr.) with fruit paste. *Dose.*—1 every 3 or 4 hours.

Vapor Cubebæ cum Limone, T.H. Cubeb Oil ½ drachm, Oil of Lemon 10 minims, Light Magnesium Carbonate 20 grains, Water to 1 ounce. Has stimulating effect in chronic bronchitis.

CUPREÆ CORTEX.

Cupreine, an alkaloid, occurs with Quinine in Cuprea Bark, *Remijia pedunculata* and other species.

It is allied to Quinine. Its salts have been similarly employed. It can be converted into Quinine by treating with Sodium in Methyl Alcohol Solution and heating the Solution with Methyl Iodide.

Several Cupreine derivatives have been recently used therapeutically.

Quinine (*Syn.* Methyl Cupreine) is $C_{20}H_{24}N_2O_2 = 324{\cdot}312$.
Cupreine is $C_{19}H_{22}N_2O_2 = 310{\cdot}291$.
Hydrocupreine is $C_{19}H_{24}N_2O_2 = 312{\cdot}307$.
Methyl Hydrocupreine (*Syn.* Hydroquinine) is $C_{20}H_{26}N_2O_2 = 326{\cdot}328$.
Ethyl Hydrocupreine (*Syn.* Optochin) $C_{21}H_{28}N_2O_2 = 340{\cdot}349$.

Methyl-Hydrocupreine Hydrochloride. *Syn.* HYDROQUININE HYDROCHLORIDE, $C_{20}H_{26}N_2O_2.HCl.2H_2O=398·828$.

Contains 2H atoms more than Quinine.

Dose.—Intravenously 4 to 12 grains (**0·25—0·8 Gm.**) for adults—for malaria. For whooping cough in young children up to 6 months, ⅓ to ¾ grain (**0·02—0·05 Gm**), 6 to 12 months, 1½ grains (**0·1 Gm.** from 2 to 14 years, 1½ to 8 grains (**0·1 to 0·5 Gm.**) intramuscularly.

When heated with strong Hydrochloric Acid it loses a Methyl group and is converted into Hydrocupreine, $C_{19}H_{24}N_2O_2$.

Soluble.—1 in 8 of water (by our experiments). Destroys parasitic protozoa and has been advised by intravenous injection in malaria and trypanosomiasis. It gives the usual reactions for Quinine, excepting in not reducing permanganate.—L. ii./12,1161; B.M.J. ii./13,25.

Ethyl-Hydrocupreine Hydrochloride. *Syn.* ✱OPTOCHIN (T.M. 356220) HYDROCHLORIDE, $C_{21}H_{28}N_2O_2HCl.=376·817$.

Dose.—8 grains (**0·5 Gm**). (Maximum 24 grains, *i.e.*, 3 doses—in pneumonia.)

A white crystalline powder *soluble* 1 in 10 in water (by our experiments).

Uses.—In pneumonia, Sir Almroth Wright says, has been tried in dose of 0·5 to 2 Gm. daily (or less)—in some cases *per os*, in others subcutaneously and in others both *per os* and subcutaneously, but its use is not without danger to the optic nerve. "Inefficacious or doubtfully efficacious, but it would be ill to conclude that the body fails to exert a favourable influence in pneumonia."

Although this compound acts powerfully on pneumococci *in vitro* and completely cured mice infected with the disease and rendered human blood bactericidal, it did not cure infected patients. Sir Almroth Wright believes the negative results are due to the fact that in man pneumonia is attended with coagulation of lymph in the air spaces of the lungs, and the germs shelter behind this rampart. In mice, however, pneumococcic infection has the form of a septicæmia.—L. ii./12,1633,1705.

By injecting Ethyl-Hydrocupreine Hydrochloride before experimental inoculation with the pneumococcus 90% of the mice were saved and in 50% death was prevented when the injection was used after infection.—L. i./13, 1511.

Originally put forward for trial by Morgenroth, Berl. Klin. Woch., 1911,34, 44. See also B.M.J.E. i./14,11.

Pneumonia must be treated in the very *early* stages. Nine cases reported on with total dose varying between 15 and 60 grains. Rapid defervescence of fever in about 48 hours —H. J. Vetlesen, Berl. Klin. Woch., 1913, No. 32

Hydroquinine and Ethyl-hydrocupreine compared with other Quinine Alkaloids. The first mentioned has the highest antimalarial value—*i.e.*, the smallest doses which will free the peripheral blood of asexual parasites in benign and malignant tertian infections combined (Hydroquinine Hydrochloride 0·765 Gm. per 70 kilo body weight, quinine sulphate 0·95 Gm., Optoquin 1·22 Gm., etc., the figures referring to alkaloidal bases not their salts). —Maj. MacGilchrist, Indian Journal of Medical Research, Calcutta, 1915, iii./1, B.M.J. ii./15,827.

Streptococci in serum are killed by Optochin in high dilution.—Sir A. E. Wright, L. ii./15,1012.

Gonorrhœa treated with Optochin 1% solution—injected. Discharge quickly lessened. Cure in 8 days.—B.M.J.E. i./16,8.

Toxic effects on the eye. Patient took 120 grains in 5 grain doses during an attack of pneumonia. Possibly smaller doses may suffice to kill the pneumococcus but it is a dangerous drug.—G. H. Oliver, B.M.J. i./16,580.

CUPRUM.

$Cu = 63·57$.

Antidotes to Copper Salts.—Stomach-pump, emetics, white of egg and milk. Hot fomentations to the stomach, barley water, morphine or laudanum to relieve pain.

Colloidal Copper —*see* **Colloidal Metals.**

For details of Copper (Metallic) as an antiseptic for water, milk, etc., see Vol. II.

Incompatibles with Copper Salts.—Alkalis and alkaline carbonates, also preparations containing tannin and iodides.

Cupri Acetas Neutralis. $(CH_3COO)_2\ Cu,\ H_2O = 199·654$.

Dose.—$\frac{1}{12}$ to $\frac{1}{2}$ grain (**0·005 to 0·03 Gm.**).

Dark green crystals. Applied to ulcers acts as a stimulating caustic.

Soluble 1 in 15 approximately of water ; only slightly in alcohol.

In tuberculosis has been given with Sodium Phosphate 1 grain, Tragacanth Mucilage $\frac{1}{2}$ ounce, or as :—

Pilula Cupri Acetatis, $\frac{1}{6}$ grain in each with Sodium Phosphate 1 grain, Liquorice Powder and Glycerin *q.s.*

In tuberculosis Copper Acetate in pills containing 0·01 Gm. It is well to give a little milk or Vichy water or a menthol pastil at the time.—B.M.J.E. i./13,95. (*c.f.* also **Copper Phosphate Colloidal Suspension.**).

The fatal dose *per os* is said to be 154–184 grains, and 154 to 308 grains of the Sulphate. Attempted abortion with Fehling's Solution. —B.M.J.E. i./07,83.

Cupri Subacetas. *Syn.* **Verdigris, Aerugo.**

Is usually of indefinite composition, principally $[(C_2H_3O_2)_2Cu + CuO + 6H_2O] = 369·304$, and only partly soluble in water. Occurs in greenish partly crystalline powder.

Linimentum Æruginis. Ph. Lond.

A decoction of verdigris, vinegar and honey is employed in veterinary work.

St. G. H. has **Gargarisma Æruginis** 1 grain in the ounce with honey and glycerin.

Cupri Citras.

$C_6H_4Cu_2O_7 + 2\frac{1}{2}H_2O = 360·242$.

Greenish powder slightly soluble in water.

Unguentum Cupri Citratis. *Syn.* **'Cuprung,'** is supplied 5, 10, 15, 20 and 25% strength for use to ulcerations and granulations on the eye-lids. R.O.H. has 5%.

***Cuprentum** (T.M. 364414).

An ointment containing 5% of copper citrate.

Cupri Oxidum.

$CuO = 79·57$.

Is supplied commercially as 'precipitated' by adding Caustic Alkali to Cupric Sulphate solution, washing and drying, also 'granulated' by heating to partially fuse.

Cupri Sulphas. $CuSO_4,\ 5H_2O = 249·71$.

Average Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**) ; as astringent $\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**) ; as emetic 5 to 10 grains (**0·3 to 0 6 Gm.**). (*Off.*).

Blue Crystals. ***Soluble*** in water 1 in 3½, in glycerin 1 in 2 (but may crystallise out again); insoluble in alcohol.

Uses.—Given internally in very small doses for severe diarrhœa and cholera, usually combined with opium (R.F.H. Pill ½ grain of each), and has been tried as rectal injection also for internal hæmorrhage and intestinal ulcers. ***Rapid Emetic*** for narcotic poisoning, three or four grains in water every few minutes until vomiting occurs. Also suitable for acute phosphorus poisoning.

Locally in eye affections as stimulant and for gleet.

Actinomycosis and blastomycosis have been treated by internal administration and irrigation with 1% solution. In syphilis treatment with copper sulphate and potassium iodide may prove useful.

Membranous colitis in children, well treated by injection of solution of 4 grains to the ounce with a little opium added.—L. i./06,94.

In dry skin affections, and in tubercular tendencies, $\frac{1}{10}$ grain doses thrice daily, appear to act like arsenic, and are better tolerated.

In pyorrhœa alveolaris the gums are 'packed' with copper sulphate, and the patient directed to swab the gum with saturated solution of tannin in Eau de Cologne; the tartar is frequently removed.—Smale and Colyer.

Erosion in chronic endometritis treated by scarification and bathing with 7% copper sultsphate solution.—B.M.J. ii./09,1031.

Trachoma best treated wiih this drug.—B.M.J. i./09,327,975.

Ionisation of copper, *vide* Iontophoresis. *Bactericidal Action, e.g.,* for purifying water. *Vide Vol. II.*

Guttæ Cupri Sulphatis, R.O.H. 1 or 2 grains to the ounce. Suitable as a lotion for gleet. For styes epilate the lashes affected and use a 1 in 100 lotion ten to thirty times a day. The lashes will grow again.

Copper Points, contained in turned wood holders, are useful for eye and intra-uterine medication.

Alibour Water.

Copper Sulphate 2½ drachms, Zinc Sulphate 9 drachms, Camphor 1 drachm, Powdered Saffron ½ drachm, Water 40 ounces.

Diluted with five or six times its volume of water, useful as a wet dressing in eczema.—M.P.C. i./12,8.

Ammonio-Cupri Sulphas. *Syn.* CUPRAMMONIUM SULPHATE, $CuSO_4.4NH_3.H_2O = 245{\cdot}782$.

Dose.—½ to 1½ grains (**0·03 to 0·1 Gm.**), with Laudanum after meals.

Blue crystals soluble in water. Used in nervous affections. Lethal dose of this salt is stated to be equivalent to 0·05 Gm. of Copper per kilo body weight. Subcutaneous injection of equivalent in strength to 0·6 to 0·7% Copper tried in mouse carcinoma with promising result.—B.M.J. ii./13,222.

Cancer of the uterus claimed to have been cured by intramuscular (intragluteal) injections of a 1% Ammoniated Copper Sulphate Solution (exact formula not given). The Copper is thought to be reduced and precipitated as suboxide by the glycogen of the neoplastic cells which in consequence lose their vitality.—L. Manara, L. ii./15, 1205.

Cupri Chloridum, Cupric Chloride $CuCl_2+2H_2O=170·522$.

Dose.—¼ to 2 grains **(0·016 to 0·12 Gm.).** Use similar to Copper Sulphate. Greenish very deliquescent crystals.

Lapis Divinus R.O.H. Cuprum Aluminatum P.G.

Potassium Alum, Copper Sulphate, and Potassium Nitrate, of each 1 part are fused together. Camphor equal to $\frac{1}{50}$ of the whole previously mixed with an equal weight of Alum is added and incorporated, and the mixture run into moulds to form pointed sticks. (G.H. has less camphor.)

P. Jap. adds Camphor 1 to 10, each of the other ingredients previously fused.

'Brass Paste.' Formed by combining Basic Copper Sulphate 86 with Basic Zinc Sulphate 14.

For cutaneous and other forms of tuberculosis stated to be quite innocuous —application to the conjunctiva of the everted eyelid resulted in the removal of all tuberculous tissue in a case of 20 years' duration.

A fluid preparation "BRASS OIL" or "BRO" applied on gauze also used. Further PICRIC BRASS PASTE containing 1% of Picric Acid found more penetrating.—H. A. Ellis, L. i./10,415.

The following **Organic Copper Compounds** have been suggested by G. T. Morgan for trial:—

Cupri Alloxanas $(NH_2CONH.CO.CO.COO)_2\ Cu = 381·698$.

A bluish green flocculent powder slightly soluble in water. The relative insolubility is a disadvantage from the therapeutic standpoint.

Cupri Glycinas $(NH_2CH_2COO)_2\ Cu = 211·674$.

A blue flocculent silky powder soluble about 1 in 200 of water at 15° C., but more than twice as soluble at 40° C. We have had this body tried pharmacologically in the form of a 0·5% solution intravenously.

0·06 Gm. per kilo killed a rabbit in 8 minutes, whilst a control of Salvarsan in proportion 0·1 Gm. per kilo was completely tolerated, hence the substance has a toxic dose of about 30 grains weight for weight for an average man and this would have to be taken into account in further work. An average rabbit is taken as 2 Kilo.

Cupri Hippuras $(C_6H_5CO.NHCH_2COO)_2\ Cu = 419·808$

A bluish green crystalline powder. Almost insoluble in water. but soluble about 1 in 200 of a mixture of glycerin and water equal parts. It is more soluble in pure glycerin.

Copper Alanine, *Syn.* **Copper Amino-propionate** $(CH_3.NH_2.CH.COO)_2\ Cu=239·716$, and Copper Glycine are soluble in serum without precipitating serum protein or other proteins. They possess toxic action or protozoa. Possible use in protozoal infections and in cancer. Preliminary trials in cancer have been made (J. Donelan).

Copper Alanine is *soluble* 0·44 in 100.

Saturated Solution thought unsuitable for intravenous use but 1 in 300 suggested. Doses of 1 to 2·5 Cc. of the saturated solution have been used.—J. A. Shaw-Mackenzie, B.M.J. i/20, 104,174.

DAMIANA.

The leaves of *Turnera diffusa var. aphrodisiaca* and other species (*Turneraceæ*) are recommended in the United States as possessing aphrodisiac properties. Useful in melancholia. Said to be tonic and diuretic. Contains bitter substances, resins, and volatile oil.

Has also been fictitiously called "**Bohadschia**" **(Aphrodisiaca),** and a further name is Hysterionica Baylahuen.

Extractum Damianæ Liquidum, B.P.C. 1=1.

Leaves in 60 powder exhausted with alcohol 60%.

Dose.—½ to 1 drachm.

Flavoring.—Glyl Pini, Syl Rosæ, Syl Lavandulæ.

Extractum Damianæ.

Dose.—2 to 10 grains **(0·12 to 0·6 Gm.)**. Is prepared by concentration of the above.

ⓅMistura Damianæ Composita.

Dose.—1 to 2 drachms **(4 to 8 Cc.)**.

Sodium Hypophosphite 5 grains, Calcium Hypophosphite 5 grains, Liquid Extract of Damiana ½ drachm, Liquid Extract of Nux Vomica 2 minims, Chloroform Water to 2 drachms.

ⓅPilula Damianæ Composita.

Extract of Damiana 2, Phosphorus $\frac{1}{100}$, Extract of Nux Vomica $\frac{1}{5}$. Liquorice Powder *q.s.* to $3\frac{1}{6}$ grains. *Dose.*—One, two, or three times a day.

Capsules of Damiana Extract are each equivalent to 30 minims of the liquid extract.

DECOCTA.

Decoctions of drugs are usually prepared 5% (unless otherwise stated) by boiling the drug in coarse powder with distilled water for 10 minutes and straining. If necessary a few drops of Chloroform or Formaldehyde will preserve fresh decoctions for a reasonable period of time. For various decocta consult index. *The strengths of decoctions of powerful substances should be specified by the physician* (U.S.).

Decocta Concentrata are prepared commercially as a general rule '1 to 7.' They should contain at least 20% Alcohol—as a preservative. Fresh decoctions are preferable.

Ⓟ DIGITALIS FOLIA.

Dose.—½ to 2 grains **(0·03 to 0.12 Gm.)**.

Fr. Cx.—*Maximum single dose* 3 grains, *maximum during* 24 hours 15 grains approx.

The dried leaves of *Digitalis purpurea* (*Scrophulariaceæ*) or foxglove, collected from plants commencing to flower.

Powdered drug (leaf of the second year) to be used *entire.*—F.I.—(*Off.*) and Fr. Cx. adopted.

Assay of Digitalis *and its preparations both chemically and physiologically is fully dealt with in Vol. II. q.v.*

We have recently conducted a somewhat extended **examination of Digitalis Leaves,** grown under differing conditions both in this country and abroad, with interesting results. We are of opinion that Digitalis leaves *should be collected from plants grown in a dry, sunny situation*—preferably after a spell of dry weather. We found that plants grown in the sun provided leaves which were more active weight for weight than the larger leaves of plants cultivated in the shade. The effect of increased sunlight in content of active principles has been noted in other drugs, *e.g.*, Belladonna.—For the complete investigation, see "**Digitalis Assay**" by W. H. Martindale (H. K. Lewis), 1913.

For **Digitalis Seeds** *see Vol. II.*

Uses.—Valuable heart tonic and stimulant diureticin pulmonary œdema and dropsy. Simultaneous purging is said to be a useful adjuvant to treatment of cardiac disease with digitalis.

Discovery of the value of Digitalis; not greatly used until 1775, when Withering established it on a firm therapeutic basis, recognising its value when arterial tension low and unsuitability in high tension.—P.J. i./08,667; L. ii./08,109.

Much discussion has taken place at the B.M.A. Meetings and elsewhere on the effect of Digitalis on the heart, and the value of the preparations and methods of standardisation. The following is a résumé:—

Digitalis has a narrowing influence upon the arteries. Further investigation will show which part this vascular influence plays and how far its occurrence may be provoked or avoided in different cases. Acting on the vagus it pulls the reins of the heart. Acting on the heart muscle it is a most useful whip, at the same time providing it with food by bettering the circulation. Slowing the heart, it makes it irregular also. This slowing gives the heart an opportunity of resting, so secondarily improving contractility, conductivity and excitability. By primary action it increases its strength, regulates its rhythm by depressing excitability and conductivity. In large doses it may increase excitability causing extra-systoles, perhaps diminish contractility, by causing long pauses do harm to the circulation. All these influences vary according to dose, form in which it is given and the conditions of the heart. The question is just how is it possible to build up a rational use of Digitalis at the bedside. It may be tried with success in every case where the condition of the heart is the cause of a bad circulation or troublesome symptoms. In doubtful cases give small doses. It should be given a fair trial in every case—especially in the form of powdered leaves.—B.M.J. ii./10,1600.

J. Mackenzie lays stress on determination of the '*rest-power*' of the heart and the '*work power.*' With the patient in bed in comfort, with circulation maintained, the rest-power is considered intact; if, however, evident signs of inefficient circulation, *e.g.*,dropsy, dyspnœa, orthopnœa, then there is exhaustion of rest-power. The work-power is the function of the heart which enables it to increase its force when an effort is made. The amount varies with each individual. As standard by which to test this work-power one takes the amount of exertion the individual can take with comfort. The first evidence of heart failure is the premature exhaustion of the work-power. Great reliance is placed on the *B.P. Tincture* in preference to the Glucosides. The amount of the drug requisite to produce the first physiological effect is noted, and the quantity that maintains the heart in the condition best fitted to carry on the circulation efficiently. It may be that a given amount slows the pulse from 100 to 60 beats per minute, and coincident with the slowing there is improvement in patient's condition. If pushed further there may be still further slowing, but there may be untoward effects—thumping of the heart, breathlessness, etc.,—the dose is gradually reduced to a point to maintain the greatest comfort.—B.M.J. ii./10,1606.

Referring to the above paper H. H. Turnbull reports that giving 15 minims 4 times daily it was found that the average quantity taken before symptoms were produced was about 6 drachms, though cases varied from about 3¾ to 11¾ drachms. As to time required to produce full effect this varies. If rapid action was desired large doses—up to 2 drachms of Tincture *per diem* were given and with this, sickness (sign of full dose) and beneficial cardiac effects can be produced in 36 to 48 hours. If only 1 drachm *per diem* be given a period of 4 to 8 days is usually required to produce satisfactory result. Cardiovascular effects, heart block, extra-systoles, action of dilatation and febrile heart cases are considered. 'Full doses are necessary to produce effects of the drug and unless it is pushed no result may be obtained in cases which would at once react to large doses.' No danger in pushing the drug if type of case is taken into consideration and result watched. In most cases the nausea was the limit sign determined by patients, and the only cases likely to show bad effects are those with damaged auriculo-ventricular bundle in whom heart-block may result. 15 minims of the Tincture *t.d.* has been given to out-patients with excellent results. Raised blood pressure is no contraindication to the use of Digitalis, and is often due to some secondary effect of the heart failure.—B.M.J. ii./10,1608.

The Choice of a Diuretic.—Digitalis when given in suitable cases is a safe and efficient promoter of diuresis, but the kidneys must be capable of responding to its action which is by causing contraction of peripheral blood vessels—those of the kidney excepted—and increasing the force of the cardiac systole. It therefore raises blood pressure and forces more blood through the kidneys. In renal disease, however, the blood pressure is often raised already, and to raise it still further is to force upon diseased organs which are already greatly overtasked an amount of additional work, which, in their crippled state, they cannot perform. Other drugs belonging to this group are Strophanthus, Convallaria, Strychnine and Squill. Digitalis, being a cumulative drug, if continued too long without a pause, when used as a diuretic even in moderate dose, may begin to produce signs of depression.—Eustace Smith, B.M.J. i./11,289, *et seq.*

Considerable delay occurs before Digitalis (and Colchicum) produce their effect even after absorption. It is not perhaps until several hours after introduction of the first dose that the patient is under the maximum influence. This is the reason why the treatment of pneumonia by cardiac tonics is commenced early to assist heart's action in event of it beginning to fail.—P.J. ii./11,15.

In certain cases of Bright's disease, when dyspnœa is present the symptoms may be successfully combated by means of Digitalis, or Ether, by stimulants, and by expectorants.—Tirard, Clin. Jl., April 5/11,401.

A series of observations on the effect of Digitalis and other drugs. 1 to 2 drachm doses of the Tincture given daily until some definite effect obtained. Tables of cases. Variation in action and effect, due to nature of lesions rather than to any differences in the drugs. Cases of auricular fibrillation responded well unless pyrexia present, or unless there were marked fibrotic changes in the heart muscle. Cases without auricular fibrillation rarely showed marked improvement.—F. W. Price, B.M.J. ii./11,810; L. ii./11,506.

This authority finds, contrary to general expressed belief, that

Digitalis does not raise blood pressure in man by constricting the peripheral vessels, and there is no risk in giving it in case of those suffering from degeneration of the blood-vessel walls.—B.M.J.ii./12,689; ii./13,671; L. ii./12,460; ii./13,810. He states further that there is no essential difference between Digitalis, Squill and Strophanthus in the action on the heart, but the last two showed considerable variation in regard to dosage. Digitalis is more certain in effects. Aconite had no effect upon the pulse rate. Not in favour of the so-called alleged active principles of Digitalis.—F. W. Price, B.M.J. i./13,484.

Withering (*vide antea*) advocated the use of Digitalis as having a power over the motion of the heart. It was to be continued 'until it either acts on the kidneys, the stomach, the pulse or the bowels.' Atropine largely fulfils the want of a remedy (absent at that time) 'to counteract the effects of Digitalis if inadvertently the doses be presented too largely, too rapidly or urged to too great a length.' Digitalis cannot influence heart-rate in presence of febrile stimulation. It has found its greatest successes in uncomplicated mitral regurgitation associated with the general evidence of cardiac failure.

James Mackenzie in the issue of 'Heart,' dated Aug. 31, 1911, records results of use in 40 cases. Of these 20 had mitral stenosis, one was described as 'mitral,' 10 as 'mitral and aortic' disease, two as 'aortic' and the rest a miscellaneous group containing cases of paroxysmal tachycardia, bradycardia and emphysema. 10 of the mitral stenotic cases responded well to the drug, 8 did not. Of the mitral and aortic cases only one seems to have responded; neither of the two 'aortic' cases was notably affected, while in the miscellaneous group 4 improved and 3 did not. The general conclusion was that 'cases of auricular fibrillation are more readily and markedly affected than cases with normal rhythm,'—*i.e.*, the form of irregular heart usually associated with mitral disease, especially in younger subjects who have suffered from rheumatic fever, and in whom the cardiac muscle is fairly sound, respond most easily to the drug. It is thought that the diuretic effects of Digitalis may be observed without any perceptible change in the heart. The Tincture was mostly used in dose of 15 or 20 minims three or four times a day 'until some definite reaction was obtained.' Aconite, long regarded as a retardant of cardiac action was quite inert in medicinal doses. Strophanthus though acting well in regulating irregular hearts was never seen to succeed when Digitalis had failed. Atropine was potent in accelerating some hearts retarded by the action of Digitalis.—Leader, L. ii./11,956; see also B.M.J. ii./11,869.

Digitalis in non-valvular heart disease. Reliance is placed on a good tincture rather than the so-called pure principles of the drug. Digitalis more certain than Strophanthus or Squills. Tinctures should be dispensed *as such* or only with alcoholic preparations.

The action of Digitalis is slow—rarely is any distinct change seen before four days. For more rapid effect Strophanthin intravenously $\frac{1}{250}$ to $\frac{1}{100}$ grain.—Cushny, B.M.J. ii./12,685 *et seq.*

A case of auricular fibrillation and pregnancy. Patient had an intolerance to Digitalis. Nausea and vomiting were caused by it, but she became more tolerant to it, and on one occasion took 11 drachms before feeling sick. On several occasions when the heart was beginning to fail it could be definitely ascertained that the amount of urine was decreasing. With the administration of Digitalis the amount increased—sometimes to as much as 90 ounces. In this patient the effect of Digitalis was to slow the pulse, improve the pulmonary condition and sometimes to promote diuresis. Digitalis was given just before the child was born—which occured after the full effect of the drug was established.—C H. Miller, L. ii./12,1218.

Emetic action of Digitalis. It is impossible to regard Digitalis as emetic by irritation of the gastric mucosa—vomiting caused by stimulation of the "vomiting centre" in the medulla. If general clinical experience should confirm this, vomiting after Digitalis will be regarded not so much as a check to the further administration of Digitalis, but as an indication that adequate quantities of the drug have been absorbed.—L. ii./13,1014.

Rheumatic heart of children, Digitalis in.—G. A. Sutherland B.M.J. ii./19,50.

Theocin in conjunction with Digitalis *v.* Theocin.

In treatment of aortic incompetence Digitalis is not advised. Success with Nitroglycerin. G. Evans records on the other hand definite improvement from its use with increase in urine elimination. —L. ii./16,249.

Cumulative Action.—This has been dwelt upon in the past. Clinicians hold that in the case of the *Tincture* it may be ignored, especially in view of the customary procedure nowadays to give a large initial dose.

It is questioned, however, whether more than 2 maximum doses should be given during 24 hours.—L. ii./10,575.

Irritant effect to the renal epithelium may be caused by Digitalis as the appearance of blood and albumen in the urine of animals after large doses shows.—Cushny, L. i./17,442.

Antidotes.—After emetics give gallic or tannic acid, camphor, nitro-glycerin, coffee or tea, also ether or alcohol. Aconitine $\frac{1}{120}$ grain hypodermically to be repeated in $\frac{1}{2}$ hour if heart action improves. Patient should lie down until recovery.

Incompatible with preparations of cinchona and with lead acetate, also with iron salts (but the blackening is preventable by citric acid) and with iodine and potassium iodide.

Ⓟ **Extractum Digitalis.** Fr. Cx. Dried leaves extracted with 70% Alcohol, evaporated to soft extract.

Ⓟ **Infusum Digitalis** (*Off.* and B.P. 1898). About 1 in 143.

Dose.—2 to 4 drachms (8 to 15 Cc.).

According to recent research this is an active preparation.—P.J. i./01,699; i./13,403; but of course it does not keep.

In granular kidney with cardiac failure the fresh infusion is of special value combined with some vasodilator.—L. ii./08,519.

U.S. IX.—Digitalis 15, Boiling Water 500; infuse one hour, strain, and add Cinnamon Water 150, finally cold Water *q.s.* to 1,000.

Ⓟ **Acetum Digitalis, Ph. Ned.,** Digitalis Leaves 1, Dilute Acetic Acid (6%) 9, Alcohol (90%) 1, Macerate 5 days.

Ⓟ **Fluidextractum Digitalis, U.S. IX.** 1=1 by percolation with alcohol 75% approx. Biologically assayed., *c.f.* Digitalis, Vol. II *Average dose.*—1 minim **(0·05 Cc.).**

This is stated to deteriorate at the rate of 11% per annum.—Am.Jl. Ph.,Mar./08,120. Ⓟ **P. Dan.** has also an 'Extractum Fluidum' 1=1.

Ⓟ **Digitalone.**

Dose.—Hypodermically 8 to 15 minims **(½ to 1 Cc.).** *Per os* 15 to 30 minims **(1 to 2 Cc.)** cautiously increased. Is practically $\frac{1}{10}$ the strength of the U.S. preparation. Contains chloretone as preservative and 'anæsthetic.' Physiologically standardised.

Ⓟ **Tinctura Digitalis.** (*Off.*). 1 in 10 of 70% Alcohol=F.I., B.P. 1898 was 1 in 8 of 60% alcohol.

Dose.—5 to 15 minims **(0.3 to 1 Cc.)**

Frequently single doses of as much as 1½ drachms are given. Large single doses in many cases preferable to repeated small doses. —P.J. i./11,164.

Might be made with 45% alcohol.—P.J. ii./09,142.

U.S. IX. 1 in 10. The spirit strength has been *increased.* It is now 70% as *Off.* Biologically assayed, *c.f.* Vol. II.

Fr. Cx.=F.I. max. single dose, 25 minims; max. during 24 hours 90 minims approx.

Physiologically Standardised Digitalis Tincture. *Dose.*—5 to 15 minims, is of strength 0·75 Cc.=Minimum Lethal Dose per 100 Gm. of frog.

PHYSIOLOGICAL EXPERIMENTS which we had specially conducted for us (1913) would indicate that there is a slight falling off in strength in 12 months. The tinctures in question were stored in half light in corked green flint bottles, *i.e.*, in circumstances favourable to decomposition and representative of the conditions which would obtain where no special precautions are taken. The frog experiments though as a whole concordant, were not above question. The deterioration is, we think, not so marked as the frog tests sometimes show. Indeed, we have been able to demonstrate that a tincture ***12 Years*** old is quite up to the standard—this was confirmed by physiological test.—*c.f.* L. i./13,77. *We deal with this matter more fully in Vol. II.*

Haynes has shown that a tincture will keep for 2 years without undergoing any material alteration in activity.—Dixon, Q. Jl. Med., Jan. 1912,297.

Digitalis Leaves of good quality as a rule do not deteriorate (contrary to many opinions) or only with extreme slowness—at a rate probably not exceeding 1½ to 2% a year. The same holds good regarding Pharmacopœial (U.S.) preparations made with a menstruum containing at least 50% Alcohol The Acetic Fluid Extract is worthless. The conclusions are based on physiological examinations on cats and frogs. A Fluid Extract 30 years old, found to be 32% more active than average of 13 present day specimens of commerce. —R. A. Hatcher and C. Eggleston, Am. Jl. Ph., May, 1913.

Hallaway, on the other hand, has stated that the tincture must not be kept longer than 6 months (in amber bottles away from light).

Maceration for 24 hours with ½ ounce of hide powder to the pint is said to detannate this tincture.

There is much divergence of opinion amongst medical men as to the relative values of the Tincture and the freshly made infusion.

In a recent investigation comparing Alcoholic Tinctures and water-soluble glucosides from Digitalis, E. Berry found the latter gave the most desirable therapeutic effect. Details are given for preparing a solution of water-soluble glucosides free from Digitoxin and Saponins. —P.J. ii./15,783.

Flavoring.—Glyl Coriandri, Syl Lavandulæ; Syrupus Aurantii.

In aortic disease, when compensation fails, bold doses, *e.g.*, 15 minims, every four hours, with safety.—B.M.J i./07,611.

Ⓟ **Tinctura Digitalis Foliorum Recentum**—*Martindale.*

Dose.—5 to 15 minims **(0·3 to 1 Cc.).**

Prepared from fresh second year's leaves and chemico-physiologically standardised to normal (=M.L.D., 0·75 Cc. per 100 Gm. frog). Kobert and other authorities favour a preparation made by this method. In view of the poor keeping qualities of the leaf, unless properly stored, and the exceedingly complex composition of its active principles, the idea should be welcome.—*c.f.* P.J.ii./13,437,573.

Ⓟ **Glycetract Digitalis**.—*Martindale.*

Dose.—1 to 2 minims. A potent preparation *vide* Glycetracta.

Ⓟ **Pilula Digitalis Composita (Baillie's Pill).—St. G.H.**

Syn. **Guy's Pill, Addison's Pill.**

Dose.—1, as often as 3 times a day.

Mercurial Pill 2, Digitalis Leaves ½, Squill 1. In grains for one pill; in grammes for fifteen.

In cardiac dropsy has a deserved reputation.—B.M.J. ii./09,537.

P1 **Pilula Hydrargyri et Digitalis Composita. St. Bart.'s H.**

Mercurial Pill 1 grain, Digitalis 1 grain, Squill 1 grain, Extract of Henbane 2 grains.

P1 **Pilula Von Niemeyer.**—*Dose.*—1 pill thrice daily.

Digitalis Powder ½ grain, Ipecacuanha ¼ grain, Opium Powder ¼ grain, Extract of Helenium *q.s.*

Used in combating the fever of phthisis. When the fever is of the periodical type, with pronounced exacerbations and chills, one grain of Quinine Sulphate is added to the above formula.—*Ex* Pres.

Ⓟ **Vin de Digitale Composé.** *Syn.* Vin de l'Hotel-Dieu, Vin de Trousseau.

Digitalis leaves 1, Squill 1½, Juniper Berries 15, Potassium Acetate 10, Alcohol 90% 20, White Wine 180—all by weight.

Digitalis Glucosides.

The Digitalis (and Strophanthus) Glucosides and their preparations are for the purposes of 1908 *Act not strictly 'preparations' of Digitalis (and Strophanthus), but they should be treated as* Ⓟ.

Digitalis leaves and seeds contain several active crystalline and amorphous principles.

Digitalin (Verum Kiliani) occurs in seeds only. Digitoxin only in leaves. Digitalein occurs in both leaves and seeds.—F. Kraft. P.J. i./12,533.

Digitaline Pure Amorphe (Homolle). Fr. Cx. 1884. Ph. Belg.

Syn. CHLOROFORMIC DIGITALIN, DIGITALINUM GALLICUM.

Dose.—1/60 to 1/30 grain **(0·001 to 0·002 Gm.).**

Yellowish bitter powder. Practically insoluble in water, but soluble in alcohol and chloroform, and consists principally of a glucoside resembling Digitoxin in its action.

Granules de Digitaline (Homolle) contain 1 milligramme ($\frac{1}{65}$ grain).
Dose.—1 or 2.

Digitaline Cristallisée. *Syn.* DIGITOXIN (FR. CX.).

Dose.—$\frac{1}{250}$ to $\frac{1}{100}$ grain (**0·00025 to 0·0006 Gm.**), in pill. FR CX. has *max. single dose* $\frac{1}{200}$ grain; max. during 24 hours $\frac{1}{64}$ grain approx.

Light, white crystals, very bitter; insoluble in water, nearly insoluble in ether and benzine; very soluble in chloroform. In absolute alcohol at 15° it dissolves 1 in 80, and 1 in 43 of Alcohol 90%.

It consists almost entirely of digitoxin, is cumulative in action and very potent; should be prescribed as Digitaline, crystallized (FR. CX).

The requirements of the French Codex in regard to this Glucoside cannot be complied with. **Crystallised Digitoxin,** *q.v.*, is frequently used to replace.

Granules de Digitaline Cristallisée FR. CX. contain $\frac{1}{10}$ mgr.

Soluté de Digitaline Cristallisée au Millième. FR. CX.

Crystallised Digitaline 1, Alcohol 95% 460, Glycerin 400, Water to 1,000 by weight.

Dose.—*Max. single dose* 5 minims; max. during 24 hours 17 minims approximately.

✱**Nativelle's Crystalline Digitalin,** a special preparation, has been found satisfactory.—B.M.J. ii./05,682; M.P. July 14,/09, p. 28. It is probably identical with Digitoxin.—Am. Jl. Ph., May, 1913.

✱**Digitalin Granules, Nativelle** $\frac{1}{240}$ grain, also $\frac{1}{600}$ grain.
(✱Nativelle is T.M. 300453).

Large doses are given to diminish the period of systole and to effect diuresis. Small doses for sedative effect, *e.g.*, in palpitation and to relieve dyspnœa associated with mitral stenosis—one Granule every three or four days. As a general rule suspend administration periodically to prevent cumulative effect.

Note on a case of heart block produced by Digitalin Granules.—L. i./11,19.

✱**Nativelle's Digitalin Solution.** For intramuscular injection into the pectoral or other region free from œdema.

Dose.—1 Cc. containing $\frac{1}{240}$ grain (**0·00025 Gm.**). An oily stable solution. Ampoules are prepared.

In cases of asystole amenable to Digitalin an injection is made for four consecutive days. In milder cases of hyposystole two days following, 1 Cc. being injected on each occasion. In acute cases with implication of the myocardium and threatening cardiac failure, a single injection usually suffices to restore the strength of the contraction. May be repeated once or twice. When the case is grave an injection of Caffeine Sodio-Salicylate should be given two hours before the Digitalin. In pneumonia, according to circumstances, from one to four doses.

Indications for hypodermic use—

The hypodermic method alone is admissible (1) in grave cases where cardiac failure is imminent and immediate and certain action is required, because in such cases gastro-intestinal absorption is slow and uncertain. (2) In cases in which it is desirable to safeguard the stomach and to avoid setting up gastric intolerance or embarrassment of cardiac action by a dilated stomach, the hypodermic method must be used, *e.g.*, in typhoid with failing heart where diuresis is essential; in vomiting in arterio-sclerotics where the stomach becomes distended on the slightest irritation.

Angina treated satisfactorily with 5 drop daily doses of 1 in 1,000 solution combined with Theobromine 0·5 Gm. before midday and evening meal for 10 days, then stop the Digitalin.—B.M.J.E. i./07,4.

Digitoxin (P Helv.). $C_{28}H_{46}O_{10}$=542·508. *Dose.*—$\frac{1}{256}$ to $\frac{1}{64}$ grain (**0·00025 to 0·001 Gm.**).

Manufacture.—Grind leaves to fine powder, exhaust with water, and after drying again, extract with 50% Alcohol. Precipitate liquor with Liquor Plumbi Subacetatis, collect liquor, drive off most of the alcohol, extract residue several times with Ether, treat with water, and leave to crystallise. Recrystallise from 85% Spirit, using charcoal to decolourise.—Schmidt, p. 1640.

The content in the freshly harvested leaves is stated to be 0·25%.

This is a potent Glucoside stated to have uniform therapeutic activity. ***Soluble*** about 1 in 80 of absolute alcohol, and soluble in chloroform. Sparingly soluble in Alchohol 90%; very soluble in more dilute Alcohol.—E. Berry, P. J. ii./15,783.

In the pure condition it is stated to be insoluble in water. There is, however, physiological and chemical evidence that it is soluble in the presence of the other glucosides (*c.f.*, Am. Jl. Ph., May, 1913).

"The border land between therapeutic and toxic dose with this glucoside is so narrow that no one could walk therein." Comparatively small doses cumulative, slow in action due to slow solubility. —Am Jl. Ph., May /08,109.

Solutions may be made containing $\frac{1}{64}$ grain (**0·001 Gm.**) Digitoxin in 15 minims (**1 Cc.**) of **Petit's Liquor.** This quantity will approximate 40 drops which may be considered a maximum dose. Suitable either *per os* or as an enema. May also be given in **Syrup,** Digitoxin 0·1, Alcohol (90%) 200, Distilled Water 750, Syrup to 2,500. *Dose.*—1 to 4 drachms (**4 to 15 Cc.**).

Tablets and Granules (Pills) of Digitoxin are prepared containing $\frac{1}{250}$ grain ($\frac{1}{4}$ milligramme).

Digitalinum Pulverisatum Purum.

Dose.—$\frac{1}{10}$ to $\frac{1}{2}$ grain (**0·006 to 0·03 Gm.**) three or four times daily in pill, tablets, or subcutaneously. Consists of a mixture of Digitalin (Kiliani), Amorphous Digitonin and Digitalein.—M.Am. Non-cumulative, but caution—powerful drug. It is a yellowish-white powder ***Soluble*** in water and alcohol nearly insoluble in chloroform. *Well adapted for hypodermic injection.*

When '**Digitalin**' *is ordered either for internal or hypodermic use this substance should be supplied.*

For further expression of opinion as to the composition of these glucosides, *vide* P.J. i./11,489.

Hypodermic Tablets of Digitalin, $\frac{1}{10}$ grain (**0·0065 Gm.**).

An infant with bronchopneumonia received $\frac{1}{200}$ grain Digitalin in a hypodermic tablet every two hours for several days—this dose was not excessive—these tablets obviously too weak $\frac{1}{10}$ grain tablet should be more useful.—B.M.J. ii./09,919.

Sterules (Hypodermic) Digitalin $\frac{1}{10}$ grain also with **Strychnine Hydrochloride** $\frac{1}{100}$ grain as heart stimulants.

Tabellæ Digitalini et Nitroglycerini.

Digitalin $\frac{1}{10}$ grain (**0·006 Gm.**) with Nitroglycerin $\frac{1}{100}$ grain (**0·0006 Gm.**).

Useful in aortic disease. Where vascular tension is high the addition of Nitroglycerin prevents increase of peripheral resistance, and thus robs the digitalis of the influence on the arterioles, 'on account of which its administration is supposed to be contra-indicated.'—L. i./07,872; B.M.J. i./07,611.

In high arterial tension where the heart is beginning to fail, and symptoms of irregularity of pulse, giddiness, or even œdema of ankles begin to appear.—L. ii./08,1132.

Ⓟ ✱**Digalen** (T.M. 265442) (Cloetta's).

Dose.—5 to 15 minims.

A proprietary solution said to contain in each 1 Cc (17 minims) 0·3 mgr of an amorphous glucoside of same empirical formula as digitoxin. For œdema of cardiac debility.—B.M.J. i./05,1077.

15 minims correspond to 2 grains of Digitalis Leaves or 18 minims of Tincture.—B.M.J. ii./09,1100.

Ⓟ **Hypodermic Tablets** 1 dissolved in 15 minims makes a solution for intramuscular use of the same strength as above.

The Glucoside is said to have $\frac{1}{3}$ the M.W. of the insoluble crystalline Digitoxin. The preparation can be given intravenously without pain and does not hæmolyse blood corpuscles.—B.M.J. i./12,60. See also W. L. Symes, L. ii./11,1549.

It has probably increased diffusibility on account of its increased solubility—to which is due, it is said, absence of digestive disturbance when given *per os.*—Pharmacol, p. 16.

In nephritis with heart complications.—C. Kerr, Pr. Sept. '14.

Ⓟ**Digistrophan Tablets** are made, each = 0·1 Gm. Digitalis with in addition 0·05 Gm. Strophanthus.

ELIXIRS.

These are generally composed of a weak-flavoured syrup, with a fair proportion of alcohol. For list consult Index.

Elixir Aromaticum, Aromatic Elixir, U.S IX.

Dose.—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**).

Compound Spirit of Orange, U.S. 12, Alcohol to 250. Add gradually, with constant agitation, Syrup 375, and then Distilled Water 375. Mix with the liquid Purified Talc 30, and filter until clear; then add a mixture of Alcohol 1 and Distilled Water 3 *q s* to 1,000. (*Spiritus Aurantii Compositus*, U.S.—Oil of Orange Peel 40, Oil of Lemon 10, Oil of Coriander 4, Oil of Anise 1, Alcohol to 200).

The following saves time:—Mix the Compound Spirit of Orange with Talcum (Magnesium Carbonate better), add to this in a mortar gradually the water and alcohol previously mixed, transfer to a wetted filter and when all 'through' make up volume to 818 Cc., then add the sugar and shake or percolate the sugar with the filtrate.—Am. Jl. Ph., July, '06,332.

Elixir Simplex, B.P.C., 1894 :—

Oil of Bitter Orange 30 minims, Rectified Spirit 6 ounces. Dissolve and add Distilled Cinnamon Water 7 ounces, Syrup 7 ounces. Filter through paper moistened with proof spirit, and well sprinkled with kaolin, returning the first portions of filtrate until it passes through bright.

Dose.—20 minims to 1 drachm This quantity may be added to the ounce of a liquid medicine.

That of B.P.C. 1911 is about $\frac{1}{4}$ the alcohol strength of above.

N.B.—Alcohol Soluble drugs quite compatible with the original formula may be insoluble in the new one.

Elixir Aurantii Amari *P.N.F.* *Syn.* Elixir of Curacao

Dose.—2 to 4 drachms (**8 to 15 Cc**).

Oil of Bitter Orange 4, Tincture of Bitter Orange Peel 20, Alcohol 300. Strong Orange Flower Water 20, Syrup 400, Distilled Water (*s a.*) to 1,000, Filter through Kieselguhr.—Am. Jl. Ph. Nov. 1911, 550.

Elixir Rhei, B.P.C.—*Syn.* Liquor Rhei Dulcis.

Dose.—1 to 3 drachms.

Dissolve Anethol 0·05 in Alcohol 2·5 and add to Liquid Extract of Rhubarb 25, Syrup 22·5, Glycerin 15 and Water to 100 previously mixed; filter if necessary.

Elixir Rubrum.

Dose.—20 minims to 1 drachm (**1·2 to 4 Cc.**).

Solution of Carmine (*q.v.*) 1, Simple Elixir (B.P.C. /'94) 64. Gives an agreeable flavour and colour to liquid medicine, but is not compatible with acids.

Elixir Ficorum (*Martindale*).—*Syn.* Syrupus Ficorum.

Elixir or Syrup of Figs.

Dose.—1 to 4 drachms at bedtime or early morning.

Macerate Senna 16 ounces in cold water *q.s.* to cover twice and decant. In the first liquor heated to boiling, macerate figs cut small 32 ounces. Strain off the liquor as much as possible, and macerate the marc in the second senna liquor previously heated to boiling point. Strain off this second maceration liquor, and evaporate the two combined to 35 ounces. Dissolve in this (hot) sugar 70 ounces. Add, mixed, cinnamon oil 10 minims, oil of cloves 10 minims, chloroform 25 minims in alcohol 90% 150 minims. Make the product up to 80 ounces with water.

ENEMATA.

Substances administered *per rectum* are absorbed approximately at the same rate as when administered *per os*—exceptions are Strychnine and Quinine (slower).

B. Yeo gives the following details concerning :—

Rectal Feeding.

It is said that under the most favourable conditions it is only possible to supply by means of enemata about one-quarter of the food material required to maintain nutritive equilibrium. **Protein,** even when peptonised, is so badly absorbed as to be of comparatively little value—indeed, it is viewed as undesirable (see also **Nutrient Enemata** *infra*). The same is generally true of **Fat,** even when emulsified, but different individuals vary widely in their power of fat-absorption. **Sugar** is well absorbed, but allowance must be made for the destructive activity of bacteria breaking up sugar, so that some at least is lost for purposes of nutrition. The same is probably true in a less degree of proteids. **Water and Salts** are well absorbed. Pasteur claims that five or six ounces, gradually increasing by one ounce at a time to ten ounces, of warm water given every four hours will sustain a patient with supplementary nourishment for ten days to three weeks. Alcohol is also well absorbed. By the most careful adjustment it is difficult to raise fat absorption above 10 Gm. in twenty-four hours or that of proteid above 20 Gm. During a course of rectal feeding the bowels should be washed out once daily with an enema of tepid water before the nutrient injections are given. This cleans the bowel and washes away poisonous products of albuminous decomposition.

The injection of Nutrient Enemata should be given as slowly as possible. The best posture is with the patient on his left side, with his hips raised on a pillow. To avoid thirst not less than 2 pints of fluid should be allowed in the twenty-four hours to an average adult patient.

According to Marshall, Starch 50 Gm. *pro die* can be digested. Diluted Alcohol is readily absorbed and increases the absorption of other medicines.

Stimulant Enema. 1 to 2 ounces of Brandy with warm water 1 to 3 ounces.

Nutrient Enemata.

The absorptive power of the large intestine for proteins has been investigated by many workers. Their results show that **Peptone** is well absorbed; **eggs** given alone are not well absorbed, but if 15 grains of salt are added to each egg, they are almost as well utilised as if they had been peptonised; **raw-beef juice** is very completely absorbed; **Albuminoids,** such as Gelatin, are not absorbed. The results obtained with enemata of casein are conflicting. **Sugars** are apt in concentrated solution to prove irritating to the mucous membrane; solutions should not be stronger than 10 to 20% and not more than 300 Cc. should be given at one time; **starch** seems to be fairly well absorbed, 50 to 100 Gm. in 300 Cc. of water.

One cannot get more than 500 Calories of energy into the blood daily by this means of feeding. Milk is recommended as a basis for enemata. The addition of red wine is recommended by some; it is said to be readily absorbed, while its astringency and slight acidity seem to favour retention of the enema.—Hutchison.

Rectal feeding by Protein is not desirable. Toxic substances may be produced. 88% of the Nitrogen in Peptonised Milk was not absorbed. Of **Dextrose** (in 10% solution) however, 99% was absorbed. 6% is isotonic with blood and would be found more convenient and less irritating. 15 ounces or more of this Solution four times a day is well retained by an adult if the rectum is well washed out once a day with Saline Solution. The 100 Gm. or more of Dextrose thus given daily causes a diminution of Nitrogenous waste.—N. Mutch and J. H. Ryffel, B.M.J. i./13,111.

Enema Nutriens. L. H. *Syn.* DEXTROSE NUTRIENT ENEMA.

Dose.—5 ounces every 4 hours, or if patient can retain it 10 ounces every 8 hours.

To 1½ pints of milk boiled and cooled add ½ ounce of a reliable Pancreatic Fluid or 4 Pancreatic Tablets. Maintain at body temperature 24 hours, add 1½ ounces of Pure Dextrose. Dextrose has been proved to be absorbed by the rectum hence an important means of feeding patients who cannot take food by the mouth. The Amino-Acids separated by pancreatising the milk are also absorbed.—A. Rendle Short and H. W. Bywaters, B.M.J. i./13,1361.

Enemata to act locally on the rectum or large intestine are generally half to two pints in volume.

Glycerin Enemata for laxative effect rarely exceed ½ ounce. It is customary with Medicated Enemata *e.g.*, Enema Opii to prescribe 'Opium Tincture' *q.s.* (*e.g*, 5 to 20 minims) as desired by the physician, Mucilage of Starch to 1 (or 2) ounces, and direct this to be used at 100° F., mixed with arrowroot or gruel 5 ounces added by the attendant.

Aperient Enemata (1 to 6 pints) are made with Soft Soap, with warm water *q.s.*, *e.g.*, **Enema Simplex, L.H.** 1 ounce to the pint, or with gruel. Marshall gives the following:—

Evacuant Enemata.

Enema of Sodium Chloride 2 to 5%; Enema of Molasses 10 to 30%; Enemata of Chamomile Infusion and other vegetable infusions; Enemata of Fixed Oils ($\frac{1}{2}$ to 1 pint of Olive Oil), for inflammation of rectum associated with hardened fæcal masses. *Vide* also **Aperient** above mentioned

Enemata for action on rectal mucous membrane contain—

Alum 0·5%.
Asafetida 5%.
Boric Acid (Saturated Solution).
Bismuth Carbonate or Subnitrate 1%.
Cresol (preparations) 0·5 to 1%.
Ferric Chloride (Strong Liquor) 2%.
Infusion of Garlic and similar antispasmodic substances.
Lead Acetate 1%.
Ⓟ Mercuric Chloride 0·01 to 0·05%.
Mucilage 25%.
Oil of Turpentine 0·5 to 1%.
P1 Opium (or its alkaloids), a maximum dose (Ⓟ if containing less than 0·75% morphine). L.H has Tincture 10 to 60 minims, with Starch Enema to 4 ounces.
Salicylic Acid 0·3%
Silver Nitrate 0·1%.
Tannin 1%.

C.f. also in text Enema Magnesii Sulphatis (et Acida), Enema Naphthalini, Enema Olei Ricini and Enema Olei Terebinthinæ.

For ulceration of rectum Silver Nitrate 10 grains to the pint, also Salol Enemata 1 to 2 drachms in Turpentine (U.S.), also Ferrous Sulphate and Copper Sulphate.—Pr. Aug. '09,152.

Enema for thirst after operation (U.C.H): 2 pints of hot water.

U.C.H., C.X., E., C.H.W., St. G.H., and **W.,** and many others give formulæ for various Enemata which should be consulted.

ERGOTA.

P1 '*Ergot of rye and preparations of Ergots.*'

P1 **Ergot of Rye** (*Off.* and B.P. '98).—*Syn.* SECALE CORNUTUM.

The sclerotium of the fungus *Claviceps purpurea* (*Pyrenomycetes*) on *Secale cereale* (*Graminaceæ*).

Dose.—15 to 60 grains **(1 to 4 Gm.)** in recent powder infused in boiling water. FR. CX.—*Maximum single dose* 15 grains. *Maximum during* 24 *hours*, 60 grains approximately.

Preservation.—

To be not more than 1 year old (U.S. VIII., this is now omitted in U.S. IX.) and to be kept whole, not in the powdered condition.—(*Off.*) and F.I. *It should be kept in well closed vessels,* adding a Chloroform or Carbon Tetrachloride to prevent attack by insects. Cushny showed that old ergot is practically useless.

Antidotes.—See chapter on.

Flavoring.—The Liquid Extract, etc., are not nauseous to taste, but Syl Vanillæ, or Syrupus Limonis or Syrupus Aurantii may be used.

Uses.—Almost entirely for its action on the uterus, stimulating muscular contraction, and so to check bleeding after parturition, and from the presence of fibroid tumour, also to promote involution.

Ergotin causes spasm of arterioles and rise of blood pressure, by acting directly on the vessels independently of the central nervous system. It is useful in polyuria.

Is also given to check night sweats, spermatorrhœa and menorrhagia. It has been suggested for the relief of sleeplessness, by causing cerebral anæmia by constricting the blood vessels.

All diseases in which a drug inducing muscular contraction is indicated should, according to one authority, be treated by Ergot, *e.g.*, disturbances of the circulatory system, skin affections, acne rosacea, also nervous complaints (excessive smoking).—M./08,205.

Surgical shock prevented by Ergot with Sparteine.—L.ii./04,1395.

In surgical shock 15 minims of Injection useful.—L. ii./08,23,85.

For disordered circulation and for headache (hypodermically), alcoholism, hysteria and in acute inflammatory infections—meningitis, pneumonia, pericarditis.—New York Med. Assoc., March, 1903.

Ergot for *internal hæmorrhage* only makes matters worse by raising general blood pressure, and bleeding which has stopped may be started again by thus raising the blood pressure.—P J. i./11,179.

In chorea there is no drug more useful.—J. R. Forrest, Jan. 26, 1884, B.M.J. i./05,354. L. ii./12,1244.

P1 **Extractum Ergotæ Liquidum.** 1=1 of Ergot. (*Off.* and B.P. '98), '100%.'—F.I.

Dose of Off. preparation.—10 to 30 minims **(0·6 to 2 Cc.)** or more. It is best recently prepared (not more than 6 months old).

Fr. Cx., 1=1 by wt. Maximum *dose* during 24 hours 6 Gm. Prepared by macerating with water containing 0·05% Tartaric Acid and further treatment.—*Vide* Edn. XIV., p. 310.

F. H. Carr and H. H. Dale advise the U.S.P. process in preference. —P.J. ii./13,130, *vide* also Extractum Ergotæ.

The difficulty with this preparation is that it is liable to decompose whilst making in bulk. Instead of infusion and subsequent evaporation it has been suggested to repercolate without evaporation.—C.D. i./05,464.

Franklin suggested a semi-alcoholic preparation in place of an aqueous extraction, *i.e.*, to be made by percolating with 35% Alcohol—the resulting liquid extract is physiologically much more active—the product is of a deeper colour and better aroma. The proportion of Alcohol is stated to be enough to keep it.—P.J. ii./10,120,152.

P1 ✱ **Ergoval** (T.M. 326360).—A preparation made on these lines from Spanish Ergot. Physiologically standardised.

Dose.—10 to 30 minims, or 1 drachm in urgent cases.

P1 **Extractum Fungi Secalis Fluidum P. Austr.** Extract fat from Ergot 100 by petroleum ether ; dry the marc and moisten with a mixture of Glycerin 5, Alcohol 20, Water 20. Percolate to 100.

The preparation of **P. Belg**, (1=1) contains 1·7% hydrochloric acid and the Ergot is first freed from fat with Light Petroleum.

Normal Liquid Extract (Physiologically Standardised) may be of such strength that 0·66 Cc. will cause a rise in blood pressure of 60 m.m. in an animal weighing 1,500 Gm. A definite amount is given to a cat and tracings are taken of the blood pressure and uterine contractions, *i.e.*, the effect desired when ergot is given to the patient.

Martin found the Liquid Extract of the British Pharmacopœia a good active preparation if made from sound ergot.—P.J. ii./09, 149.

Physiological Tests on identical samples of Liquid Extract of Ergot by three different physiological experts, gave three totally different reports. Difference of opinion exists as to whether Russian or Spanish Ergot is best.—P.J. ii./09, 794.

P1 **"Ergot Aseptic."** Concentrated and sterilised liquid extract in 1 Cc. bulbs, representing Ergot 2 Gm.

P1 **Tinctura Ergotæ** (B.P. 1885). Tinctura Hæmostyptica. 1 in 4 Proof Spirit.

Dose.—5 to 30 minims **(1·3 to 2 Cc.)** or more.

Ph. Ned. has 1 in 5 Alcohol 70%. Ergot freed from fat with Petroleum Ether.

P1 **Injectio Ergotæ Hypodermica.** (*Off.*).
Dose.—5 to 10 minims **(0·3 to 0·6 Cc.).**

Ergot Extract 33% in Distilled Water with 1% Phenol. Should be freshly prepared. B.P. '98 same strength in Ergot.

Use.—In epistaxis, injection into the arm of 3 grains of Extract in 10 minims of warm water is successful. A dose of Ergotin, injected deeply into the gluteal muscles just before delivery, seldom fails to give perfect uterine contraction. Neither ergot nor iron will induce abortion in pregnant women unless previously disposed (Lombe Atthill).—B.M.J. i./89,350.

P1 **Sterules, Hypodermic** contain 10 minims of this injection.

The following case of collapse and the details of recovery contributed by the sufferer (a pharmacist) are of interest :—

> On the 10th April, 1910, I arrived at Cadiz feeling quite well, but on the 11th, at 6 o'clock in the morning, as I jumped out of bed I had a slight cough and brought up a lot of blood. I at once rang for the night porter to send for the doctor. They began treating me by burying my chest in ice and giving me Ergotin in solution. After 24 hours, finding that the Ergotin was useless and suspecting that it was probably 'old stock,' I insisted upon the doctors (there were two attending me) giving me injections of Ergotinine. I wanted, of course, a British make, but could not obtain it in the town. They injected some ampoules of Ergotinine prepared in Cadiz with most excellent results, but the hæmorrhage would recur every time that the Ergotinine was left off, and so many injections were made that fear of ergotism was entertained as some symptoms presented themselves in the feet. On the 20th April I was supposed to be sufficiently recovered to have the bed made, and this seemed to have done me no harm, but on the 21st, at 4 p.m., violent hæmorrhage returned, and by the time thedoctors arrived I was in a state of collapse. asystolic paralysis of the heart, etc Fortunately Caffeine and Ether Ampoules were obtained in time, and no doubt saved my life. Thirteen injections of Ergotinine, Caffeine and Ether were given me in the space of three hours. Besides this I took nine bags of 25 litres each of Oxygen, and afterwards always had half a dozen bags in my room waiting to be used in case of necessity. On the 28th I had another relapse with a still greater loss of blood than formerly. In two hours eight injections of Ergotinine, Caffeine and Ether were made, Oxygen was also administered, and I was again saved. On May 10th I was taken out of bed for the first time, when the convalescence began. During thirty days I took nothing but milk and ice, some days nothing but ice. In all I had about 24 bags of Oxygen and between 50 and 60 injections of Ergotinine, some 20 of Caffeine, and another 20 of Ether. I was also during the treatment given Codeine for the cough, as having had my chest buried in ice it had given me bronchitis and pulmonary catarrh. I also had Hamamelis Solution, which I found had no effect, and Perchloride of Iron in water 15 to 20 drops every two hours for two or three weeks. "My 100 hypodermics did not produce a single inflammation, in spite of four syringes by four different operators being used on my arms with the simple precaution of rinsing out the syringes and needles with ordinary boiled water obtained from the hotel and not always hot, and in some cases having stood more than an hour in my room. The only other precaution was that the operator always washed his hands very carefully sometimes even twice, and of course my skin was washed with Eau de Cologne on wool just where the injection was to be made. The needles were never flamed, nor any other precaution taken with them."

P1 **Extractum Ergotæ** (*Off.*). *Syn.*—Ergotin (B.P. '98), Extractum Hæmostaticum (F.E.).
Dose.—2 to 8 grains **(0·12 to 0·5 Gm.).**

Off. and Fr. Cx.—an aqueous extractive precipitated by alcohol and evaporated. F.I. requires this method. U.S is similar in strength and mode of making to B.P. '98, but contains 10% of glycerin.

F. H. Carr and H. H. Dale advised extraction with 60 per cent. alcohol, and itric acid added instead of hydrochloric in the B.P. '98 method: evaporated to a soft extract without filtration, it would contain practically all the active ingredients of ergot.—P.J. ii./13,130.

In chronic cases of hæmaturia occasionally useful.—Tirard, Med. Treatment. It is given to check all forms of passive hæmorrhage.

ℙ1 **Tablets and Pills,** 1, 2, and 3 grains. *Dose.*—1 to 3.

For making a hard extract for pills evaporate to dryness and add milk sugar, or powdered althea.

ℙ1 **Capsules of Ergotin** contain 3 and 5 grains **(0·2 and 0·3 Gm.).** (*c.f.* also Capsules Apiol and Ergotin.)

ℙ1 **Tablets of Ergotin, Senecin Compound** contain Ergotin $\frac{1}{2}$ grain, Senecin $\frac{1}{2}$ grain, Hydrastin $\frac{1}{2}$ grain, Hamamelin 1 grain, Chloretone 1 grain. Useful in dysmenorrhœa and menorrhagia.

ℙ1 **Ergotinina,** *Ergotinine Cristallisée* $C_{35}H_{40}N_4O_6 = 612{\cdot}537$, Fr. Cx. F.E. Barger and Carr give the formula $C_{35}H_{39}O_5N_5 = 609{\cdot}537$.—B.M.J. ii./06, 1791, and state it is practically inactive.

Dose.—$\frac{1}{200}$ to $\frac{1}{64}$ grain **(0·0003 to 0·001 Gm.).**

Fr. Cx. has the latter as *maximum single dose,* and maximum in 24 hours $\frac{1}{2}$ grain, approx.

An alkaloid in minute yellowish crystals, insoluble in water, ***Soluble*** in Alcohol (1 in 200 of 95%, Fr. Cx.), less in ether, very in chloroform, present to the extent of 0·1 to 0·25% in Ergot.

Acetic, Lactic and Formic Acids dissolve the base, especially if in concentrated strength.

Ⓟ**Solution hypodermique d'Ergotinine de Tanret.*

Dose.—3 to 10 minims (**1 Cc.** contains **0·001 Gm.).**

ℙ1 **Ergotininæ Citras.**

$C_{35}H_{40}N_4O_6.C_3H_4.OH\,(COOH)_3 = 804{\cdot}629$.

Dose.—$\frac{1}{150}$ to $\frac{1}{30}$ grain **(0·0004 to 0·002 Gm.).**

A soluble salt of the base, in greyish powder.

Ⓟ***Hypodermic Tablets** are prepared containing $\frac{1}{200}$ and $\frac{1}{100}$ grain of Ergotinine Citrate.

ℙ1 **Ergotoxine** (Sphacelinic Acid and Sphacelotoxin—Kobert, Jacobj, may contain this)—$C_{35}H_{41}O_6N_5 = 627{\cdot}553$. *Dose.*—$\frac{1}{100}$ to $\frac{1}{50}$ grain. Is described as amorphous and hardly soluble in water, and strongly active physiologically on the uterus—raises blood pressure, and is the principle in Ergot that produces gangrene in the cock's comb on injection. Solutions in dilute Caustic Alkali are injected. The effect of the alkaloid is enhanced by the coexistence of certain Amines, *vide infra.*—P.J. i./07,520, *c.f.* also M.A. 1908,15; Y.B.P., 1907,60, J.C.S., 1907,91,337,349.

Ergotinine is stated to be the Anhydride of Ergotoxine *v. supra*—one can be converted into the other.

ℙ1 **Cornutine** is apparently impure Ergotoxine.

Ⓟ* **Hypodermic Tablets** contain Ergotoxine 1/100 grain, also ℙ1 with Morphine Sulphate 1/6 grain, and ℙ1 with Strychnine Sulphate 1/20 grain, the latter being used in collapse or shock.

Ⓟ***Injectio Ergotoxinæ Hypodermica** 0·12% ($\frac{1}{100}$ grain in 8 minims). *Dose.*—2 to 15 minims **(0·1 to 1 Cc.).**

Ⓟ*✱**Ernutin** (T.M.277883)—Tubes of Solution physiologically standardised for hypodermic use, contain Ergotoxine, Tyramine and Ergamine (*v. infra*).

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* It could however be upheld that these are "preparations" of Ergot and hence be ℙ1.

In two forms (*a*) for oral.—*Dose*—30 to 60 minims to be given *per os* after labour is completed, every three hours until contraction effected, and (*b*) for hypodermic use. *Dose.*—5 to 10 minims after expulsion of the placenta.

In addition to the Alkaloid Ergotoxine, Ergot contains **Amines.**

Of the amines in Ergot two are concerned in its activity :—

(*a*) *p*-hydroxyphenylethylamine (Tyramine *vide infra*) produced by splitting off CO_2 from tyrosine. This has an action similar to, though weaker than, adrenine, produces contraction of the cat's uterus in the pregnant and inhibition in the non-pregnant condition

(*b*) β-Iminazolylethylamine produced from Histidine by splitting off CO_2. This has intense action on plain muscle. The plain muscle fibre of the uterus in particular is stimulated to contraction by minute doses. It causes fall of blood pressure To this the name ✱**Ergamine** (T.M. 324681) has been applied.

Ernutin administered after normal confinements is stated to prevent or arrest hæmorrhage and promptly produce a firm contraction of the uterus.

Hypodermic Tablets of Ergamine contain 1/65th grain (0·001 Gm.).

Evidence for the toxic origin of spasmodic asthma is brought forward by A. Eustis (Amer. Journ. Med. Sci., Phila., 1912, CXLIII., 862), who has not yet seen a case of asthma not due to intestinal toxæmia. In searching for the specific toxin, he investigated the Amines produced by the intestinal putrefaction of several amino-acids, formed in the normal pancreatic digestion of protein. He found that this body, β-iminoazolylethylamine, on injection into guinea-pigs and rabbits produced changes in the lungs similar to those found in asthma. He has found this base in the fæces of 3 *out of* 15 *patients*. He suggests that the asthmatic has lost the power, possessed by normal persons, of detoxicating this Amine formed by intestinal putrefaction.—Pr., 1912, p. 654.

B. Aminophilus Intestinalis isolated from human stools by means of a culture medium containing Histidine. It produces β-iminoazolylethylamine. This body was isolated by Barger and Dale from the intestinal extract:—D. M. Bertrand & A. Berthelot, L.i./13,523.

P1 ***p.*-Hydroxyphenylethylamine.** (Patented) *Syn.* ✱ TYRAMINE (T.M. 309250; $OH.C_6H_4.CH_2CH_2NH_2=137·138$.

Dose.– 1/12 grain (**0·005 Gm.**), repeated if necessary

An organic base which is stated to be the chief active principle of aqueous extracts of Ergot.

It contributes along with Ergotoxine to the action of Ergot, and is a constituent with the latter in **Ernutin.**

Uteramin and **Systogen** are further synonyms for *p.*-Hydroxyphenylethylamine.—M. 1913.

Uses. Its action is similar to that of the suprarenal active principle, but weaker. slower, more persistent and less toxic. Given hypodermically or by the mouth it produces a marked rise of blood pressure, with increased vigour of the heart's action. Administered in shock or collapse and for producing contraction of the uterus *post partum*.

Guggenheim found doses of 0·02 Gm. para-oxyphenyl-ethylamine failed to have any influence on parturient women.—P.J. i./13,905.

The activity of placental extracts has been shown to be due to Tyramine. It appears to be present in Ergot to the extent of 0·01 to 0·1%. It is probably a normal product of the living fungus, like Cadaverine, which was also isolated from Ergot *p.*-Hydroxyphenylethylamine was obtained from putrid meat. It may be made by heating tyrosine, and is readily synthesised by reducing *p.*-hydroxybenzylcyanide (*Syn.* Hydroxyphenylacetonitrile) with sodium and alcohol : $OH\ C_6H_4.CH_2.CN+4H = OH.C_6H_4.CH_2CH_2NH_2$.—Barger, Trans. Chem. Soc. 1909, vol 95, p. 1123 ; Engl. Pat. (1909) 314. Crystallised from xylol and distilled (B.P. 161°–163° at 2 mm.) the base forms hexagonal plates, M.pt. 161°, readily soluble in Water and in Alcohol On methylation it yields the methiodide of the alkaloid hordenine. $OH.C_6H_4CH_2CH_2N(CH_3)_3I$.—See also Biochem. Jl. 1907,2,286 ; C.D. i./09,833 ; ii./09,229 ; P.J. i./09,739,761 ; ii./09.141 ; L. ii./09,1442.

p-Hydroxyphenylethylamine is also capable of preparation in other ways : (1) by nitrating benzoylphenylethylamine, reducing the resulting *p*-nitro compound to the amine, which yields the benzoyl derivative of the product required, when diazotised in boiling solution. This benzoyl derivative is then hydrolised.—Eng. Pat. (1909 1561. (2) Another method starts from anisic aldehyde.—Perkin and Robinson, J.C.S. 91 (1907) 1079. (3) A further method, see Rosenmund, Ber. 42 (1909) 4779.—per May, pp. 137, 138.

P1 **Hypodermic Tablets of Tyramine** contain $\frac{1}{3}$ grain (0·02 Gm.)

Other Ergots than that of Rye are equally or more active. Ergot of Fescue grass from New Zealand shows chemically 0·34% alkaloid—Wheat Ergot from Sweden contained 0·12%.—F. H. Carr and H. H. Dale, P.J. ii./13,130. See also H. A D. Jowett, P.J i./13,364.

P1 ***Secacornin** (T.M. 280473).—*Dose.*—5 to 15 minims *per os* or by injection.

A preparation of the active principles of Ergot which are hæmostatic and promote contraction of the uterus.

Urine normally contains this body or one allied to it and **Urohypertensine** (the latter probably identical with iso-amylene) both causing rise in blood pressure.—L ii./09,367

Mice in which tumours had been produced by grafting, injected hypodermically with Ernutin and Pituitary Extract. The effects are somewhat similar to those obtained by Wassermann and others with Selenium, Copper, Silver, Cobalt, etc. Suggestion to inject some body, tending to kill cancer cells, in combination with something which will contract the blood vessels of the body, *e.g.;* the substances under consideration.—L. i./13,1010.

P1 **Liquor Ergotæ Aceticus.** *Syn.* **Fluidextractnm Ergotæ U.S.** VIII. Contains 2% of acetic acid, with diluted alcohol. 1=1 of Ergot.

Dose.—10 to 60 minims **(0.6 to 4 Cc.).**

U.S. *Average dose.*—30 minims.

P1 **Liquor Ergotæ Ammoniatus.**—1=1 of Ergot.

Dose.—10 to 60 minims **(0·6 to 4 Cc.).**

An efficient and reliable preparation, made with diluted ammoniated alcohol. The combination of ammonia and Ergot is indicated in some forms of post-partum hæmorrhage, &c. In dose of $\frac{1}{2}$ to 1 drachm is useful in second stage of labour when the pains are feeble but the passages are normal.

P1 **Elixir Ergotæ cum Ferro.**—*Martindale.*

Dose.—2 drachms repeated if necessary.

Dissolve Iron pyrophosphate (U.S. VIII.) 5 grains in 1 drachm warm water and add to Liquid Extract of Ergot 10 minims mixed with Simple Elixir (B.P.C. 1894) 50 minims.

N.B.—The Iron Pyrophosphate *must* be the U.S. VIII. scale preparation.

For anæmia and excessive (or diminished) menstruation in young women.

P1 **Mistura Ergotæ Sedativa S.H.**

Ammoniated Tincture of Ergot 30 minims, Potassium Bromide 8 grains, Potassium Chlorate 8 grains, Glycerin 15 minims, Chloroform Water to 1 ounce.

Ⓟ***Acidum Scleroticum.**—*Syn.* SCLEROTINIC ACID. $C_{12}H_{19}NO_9$(?) =321·222.

Dose.—$\frac{1}{2}$ to $\frac{3}{4}$ of a grain **(0·03 to 0·05 Gm.)** hypodermically in 10 minims of water.

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* These might be held to be "preparations of Ergots" and hence P1

An amorphous brown hygroscopic acid principle obtained from Ergot. Hæmostatic and anti-epileptic.

Ⓟ*__Hypodermic Tablets__ contain $\frac{1}{16}$ grain (**0·004 Gm.**) **Sclerotic Acid.**

ERYTHROL NITRAS.

$CH_2.ONO_2-(CH.ONO_2)_2-CH_2.ONO_2=302{\cdot}108.$

Syn. ERYTHROL TETRANITRATE; NITRO-ERYTHRITE. ERYTHROTETRANITRAL.

Dose.—$\frac{1}{2}$ to 1 grain (**0·03 to 0·06 Gm.**), increased to 3 grains or more in tablet form *vide infra.*

In colourless and slightly tar-like smelling crystals, ***soluble*** in water about 1 in 20,000, about 1 in 60 of absolute alcohol; melting point, 61° C. It is formed by dissolving erythrol (a sugar obtained from various lichens, e.g., *Rocella tinctoria, R. fuciformis,* etc.), in fuming nitric acid, and precipitating by sulphuric acid; is explosive, except when in solution in chocolate.

Uses.—As a vaso-dilator like nitroglycerin and amyl nitrite. Its slight solubility as against Nitroglycerin (1 in 800) renders action slower and more prolonged in reducing blood-pressure. Employed in angina pectoris, chronic Bright's disease, nephritis, aneurism, Raynaud's disease, dyspnœa, headache, and nervous affections.

For angina, to avert paroxysms even half a drachm a day was taken.—B.M.J. i./98,18,127; i./99,256,1088.

Tabellæ Erythrol Nitratis.—*Martindale. Dose.*—1 or 2.

Contain $\frac{1}{2}$ grain, combined with chocolate. **Tabellæ** $\frac{1}{8}$, $\frac{1}{4}$ and 1 grain are also prepared.

Præcordial pains promptly relieved by a tablet three times a day.—B.M.J. i./97,907; i./98,431; i./99,256; ii./99,411.

As a vasodilator in the aged better than nitroglycerin, because action slower.—B.M.J. ii./09,1314.

A doctor kept himself free from attacks of angina by daily use of the tablets for 3 or 4 years, beginning with $\frac{1}{2}$ grain thrice daily and gradually increasing.—Brunton. L. ii./08,1132.

Intermittent closing of cerebral arteries, various questions to consider as to treatment, Spirit of Nitrous Ether controls the irritable toxicity of the vessel walls; where symptoms are urgent Erythrol Nitrate $\frac{1}{4}$ to $\frac{1}{2}$ grain repeated every 3, 4, or 6 hours, as required, is advised.—B.M.J. ii./09,1110.

The effect of Erythrol Nitrate in $\frac{1}{2}$ grain doses lasts about 6 hours and no tolerance occurs. Mannitol Nitrate in 1 grain doses acts like Erythrol, but the effect is even more prolonged.—B.M.J. ii./10 1669.

Melancholia, in which affection the blood pressure is often found abnormally high, is frequently relieved by lowering it. Start with $\frac{1}{2}$ grain tablets twice daily and slowly increasing the dose to two or three grains daily.—Robertson. B.M.J. i./11,800.

In arteriosclerosis Erythrol Tetranitrate useful.—M.A. 1911.

In aortic disease for relief of serious pain Amyl Nitrite and Nitroglycerin are employed (*q.v.*). Erythrol Tetranitrate produces little effect until half an hour after its administration, and the maximum effect is produced at the end of an hour; the arterial tension gradually increases again, but it does not return to its previous condition until about ten hours after the dose has been taken.—Tirard.

In granular kidney most satisfactory.—B.M.J. ii./08,519.

Asthma, very effective in, especially if followed by some hot drink, *e g.*, Bovril, relief lasts at least 24 hours.—W. W. W.

In asthma of immense value during a paroxysm.—B.M.J.ii./11,793.

In lead colic Erythrol is an excellent sedative, as it relaxes the painful spasms of the intestinal coats.—Nouveaux Remédes, 1901,477.

Mannitol Nitrate, Mannitol Hexanitrate.—$CH_2.ONO_2.(CH.ONO_2)_4 CH_2.ONO_2 = 452{\cdot}154$. *Syn.* HEXANITRIN. NITROMANNITE.

Dose.—1 grain **(0·06 Gm.)**, increased.

The nitrate of the hexatomic alcohol mannite $C_6H_8.(OH)_6 = 182{\cdot}142$. **Ph. Ned.**

In light acicular crystals, M.pt. 113° C.; is less soluble in water but more explosive than erythrol nitrate, and if long kept is liable to decomposition. Requires extra care. Is used similarly to erythrol nitrate, and is not so costly. In angina and asthma its action is not so powerful, but probably more prolonged. B.M.J. ii./95, 1213; i./98,528

Tabellæ Mannitol Nitratis.—*Martindale.*

Contain 1 grain **(0·06 Gm.)** in chocolate.—B.M.J. i./98,893.

Prof. Silvan (Clinique de Bologne, Italy) reported (1911):—

1. When administering one mannitol nitrate tablet, one observes in the majority of cases, within 10 to 15 minutes, and sometimes even within 7 or 8, a decrease in the pressure; in two investigations, however, on more than 200 measurements, the fall did not appear before about an hour. On rare occasions, I have noted, after administering, a momentary small rise, followed by the decrease. The decrease is slow and progressive; the pressure reaches its minimum within a time varying between one hour and two hours and a half. Once this period of time has elapsed the pressure tends to rise slowly, and again reaches its point of departure within about 6 to 7 hours of the time of administration; or, as I have more frequently observed, the pressure maintains itself for a period of 24 hours even, slightly below the original level (10 m.m.).

2. The average decrease obtained was 30·40 m.m. of Hg.; the maximum decrease was 60 m.m (205 to 145 in an hour); in other tests (2 out of 12) the hypotensive action, amounting to almost *nil* after the first tablet, became evident after the second tablet, either as it was given a few hours after the first as it was only administered the next day. With prolonged administration for several days with a dose of two tablets per day, the effect is the progressive diminution of the pressure in the sense that the maximum point is every day lower than that of the preceding day. Such decrease in pressure, in two instances, where the administration of nitrate of mannitol was continued for 9 or 10 days, remained unaltered for 2 and 4 days respectively. I observed in two cases during the use of the remedy a slight diarrhœa, which ceased when the remedy was suspended. In 3 other cases a considerable headache that obstinately resisted treatment disappeared in the course of observation.

The clinical results are in agreement with the observations on the action of the remedy as "hypotensive"; its slow and gradual action explains why it is not so efficacious in the case of a crisis of angina, whereas on the other hand the use of another substance with a quick and even violent but fugitive action proves much more useful (Nitroglycerin Tablets, etc.). On the other hand, in cases in which the hypotensive condition represents the predominant symptom, or at least the most apparent cause of many of the morbid points complained of by the patients, this substance with which one can successfully diminish and maintain for a considerable time a reduced pressure, has given satisfactory and comforting results.

ERYTHROPHLŒUM.

Casca Bark.—*Syn.* SASSY BARK; ORDEAL BARK. The bark of *Erythrophlœum Guineense* (*Leguminosæ*).

Tinctura Erythrophlœi.

1 in 10 Alcohol (90%). *Dose.*—5 to 10 minims (**0·3 to 0·6 Cc.**).

P1 Erythrophlœinæ Sulphas. *Dose.*—$\frac{1}{40}$ to $\frac{1}{24}$ grain (**0·0015 to 0·0025 Gm.**) in pill.

In yellowish white granular crystals, soluble in about its own weight of water. Has the combined action of digitalin and picrotoxin, and is a local anæsthetic for eye-work in 0·05 to 0·25% solution.

The proportion of Erythrophleine in the drug is exceedingly small. An examination of the commercial salt indicated the approx. formula to be $C_{23}H_{43}O_7N.HCl$.—Am. Jl. Ph., Aug. 1912.

Antidote.—A prompt emetic or use of stomach pump, with subsequent stimulants.

Dental Use.—An almost ideal drug for the treatment of sensibility of dentine. It is a true obtundent only where locally applied, and has no central direct effect on the pulp. The sensibility in a cavity filled with the alkaloid was in 24 hours absolutely abolished.

Ⓟ **'Throphleol,'** a solution (50%) of **Erythrophleine Sulphate** in **Eugenol** is most conveniently used.

After thorough dehydration of the cavity a small piece of cotton or bibulous paper saturated with the solution is sealed with a temporary gutta percha filling, placing as much as possible in actual contact with the dentine, and left *in situ* for 24 or 48 hours, not longer, or slight inflammatory symptoms in pulp or peri-cementum supervene. With this exception it has no injurious effects even for young children. Death of the pulp has not been observed after use. Pain and peri-cementitis 2 or 3 days after filling have, however, been reported.—Dental Annual and Directory, 1904, *p.* 223.

Excavation of the approximal cavity in a first molar was painless, but that of the occlusal cavity in the same case was painful —Dental Surgeon, April 15, 1905.

EUCALYPTI FOLIA.

Dose.—5 grains (**0·3 Gm.**) or more in powder.

The dried leaves of *Eucalyptus Globulus* and other varieties, (*Myriaceæ*) of Australia, have been employed medicinally in the treatment of ague and bronchitis, and malarial fevers; an infusion 10 grains to the ounce of hot water is said to have cured diabetes; also for smoking in cigarettes in cardiac and aneurismal asthma. *E. Globulus* leaves are official in U.S. under the name of Blue Gum Leaves, but there are several Eucalyptus Trees known as 'Blue Gum,' the Sydney Blue Gum being *E. Saligna*.

5 to 10% in dusting powder is useful to ward off mosquitoes.

Patients suffering from catarrh are stated to have received benefit from sleeping on pillows stuffed with the leaves, *e.g.*, of *E. Polybractea* and *E. Smithii* (*v. infra.*).

Oleum Eucalypti.

Dose.—$\frac{1}{2}$ to 3 minims (**0·03 to 0·2 Cc.**) on sugar, emulsified, or mixed with olive oil. U.S. *average dose* 8 minims.

Eucalyptus Oil is distilled from the leaves of numerous species of Eucalypti. The oils which contain the greatest percentage of Eucalyptol are used chiefly for pharmaceutical purposes and the species now being distilled for oils of this class are *E. Polybractea*, *E. Cneorifolia*, *E. Odorata*, *E. Smithii*, *E. Globulus*, *E. Australiana*, *E. Oleosa*, and a few others. As the yield of oil varies greatly with the several species this is a controlling factor. The rectified oils of *E. Polybractea* and *E. Australiana*, are water white, those of the other species mentioned are tinged slightly yellow when freshly distilled. This peculiarity is due to the phenols differing in the two chief groups. Oils which contain as much as 70 to 80 per cent. Eucalyptol are now well known, *e.g.*, *E. Polybractea*, *E. Smithii*, etc. and have a pleasant, fragrant smell. The oil from *E. Citriodora* has an odour resembling Lemon-grass. We are much indebted to Mr. George Inglis Hudson, of Glebe, Sydney, Australia, for assistance in bringing the above information up to date, and in particular for sending us the papers of Mr. H. G. Smith who has done so much useful research in Eucalyptus Oils.

The oil from *Eucalyptus Smithii* distilled by steam is one of the richest in Eucalyptol content (up to 85%) of all Eucalyptus species examined. The terpene is dextrorotatory pinene; and the yield is also good—20 to 26 lbs. from the leaves and branchlets that can be packed in a 400 gallon tank. The volatile cough-producing aldehydes so objectionable in the oils of many species yielding a cineol-pinene product seem to be largely absent from this oil. Shaking with very dilute Sulphuric Acid and afterwards washing and treatment with Sodium Carbonate removes impurities (iron from tank). It is an excellent species from the cultural point of view.—H. G. Smith, Jl. Proc. Roy. Soc., N.S. Wales, XLIX (1915).

See also " The Botanical and Chemical Characters of the Eucalypts and their Correlation. British Association Meeting, Section B. Manchester, 1915.

(*Off.*). requires at least 55% Eucalyptol. The oil ozonizes the atmosphere whilst oxidising. The pinenes contained have the principal action in this direction. B.pt. between 338° and 392° F.; Sp. Gr. 0·910 to 0·930. It should not cause much coughing when inhaled—absence of volatile aldehydes. The unpleasant penetrating and irritating odour of the crude oils is occasioned by different aldehydes, especially valeric aldehyde.

For further information on Eucalyptus Oils see Vol. II.

Soluble in oils, fats, paraffins, about 3 in 1 of 90% alcohol, in about 3 to 5 vols. of 70% alcohol (*Off.* states, 5 vols.), and in all proportions in absolute alcohol.

Uses.—Antiseptic, a popular prophylactic, inhaled or sprayed for influenza and bronchial catarrh. Useful mixed with an equal quantity of olive oil as a rubefacient for rheumatism.

Poisoning by drachm doses. Emetics. Recovery.—L. ii./05,963,1894, B.M.J. i./06,1085. 6 drachms taken in error caused violent vomiting. Recovery. —B.M.J. i./09,1297. Poisoning by teaspoon dose. Effects were gastro-intestinal irritation and cerebral paresis. Vomiting and diarrhœa caused. Treatment by external stimulation, as on the lines of Opium poisoning.—B.M.J i./11,359.

Broncho-pneumonia of Infants, Treatment by. Surround the crib with a tent soaked in Eucalyptus Oil 1, Water 5. Evaporation of the moisture and inhalation of the Oil has soothing effect, and greatly diminishes cough.—B.M.J. ii./08,371.

Scarlet Fever treated by inunction of the Oil over the entire body.—B.M.J. ii./08,1333: B.M.J. i./09,440. The procedure is of exceedingly doubtful efficacy. It has often been tried in fever hospitals. Furthermore, likely to be exceedingly irritating to the eyes if rubbed for example over the scalp.—B.M.J i./09,307. Practised as far back as 1891. If thoroughly carried out one need not fear the spread of the infection to others.—L. i./11,1671. Not found to reduce period of infectivity (100 cases).—L. ii./11,110.

In cholera epidemics Eucalyptus Oil 10 minims twice daily has a definite prophylactic effect.—Brooke, 166.

In measles (**Milne's Method**), Eucalyptus Oil rubbed all over the entire body excepting face and hands, morning and night for the first four days, afterwards once a day until the tenth day. Tonsils and pharynx are swabbed with 10% Carbolic Oil every two hours for first 24 hours.—L. ii./11,511. Pres., June, 1911,163.

The method used in 160 cases, but modified to the extent that a more determined attack on the mouth and throat is made, *viz.*, by irrigating twice daily with weak Alum Lotion and Glycerin of Borax applied to interior of mouth and to the gums. Mortality lowered.—D. I. Connolly, Pr., Nov., 1912, 664.

Typhoid fever has been treated by 10 minim doses of Eucalyptus Oil. The oil must contain a sufficiency of ozone due to oxidation of the terpenes—or with advantage a little hydrogen peroxide may be added. There is a marked reduction in temperature.—C.D. i./05,402.

Ankylostomiasis treated with good results by Eucalyptus Oil. Two formulæ (i.) weak—Eucalyptus Oil 2 Gm., Chloroform 3 Gm., Castor Oil 40 Gm. (ii.) strong—Eucalyptus Oil 2·5 Gm., Chloroform 3·5 Gm., Castor Oil 40 Gm. *Dose*, ¼ to ½ of either according to age and condition of patient. Also successful for tapeworm and threadworm.—L. i./06,285 ; i./08,699.

Colds treated by steam inhalation with the oil, also internally 10–15 minims on sugar every 3 or 4 hours.—L. ii./08,1661. See also Oleum Cinnamomi.

Eucalyptol, U.S., Fr. Cx., F.E.—*Syn.* CINEOL ; CAJUPUTOL.

$C_{10}H_{18}O = 154{\cdot}194$. *Dose.*—1 to 4 minims (**0·06 to 0·25 Cc.**).

Is that portion of eucalyptus oil which passes over between 347° and 351° F., and crystallizes at 30° F. It is preferred to the crude oil for use in the oro-nasal inhalers, as it does not dry up as a varnish. It may be obtained from the oil by the action of phosphoric acid (Faulding's Process), with which it forms a crystalline compound, **Eucalyptol Phosphate.** On addition of water, this splits up setting free Eucalyptol. It is however not difficult to prepare Eucalyptol by **Freezing.** The Eucalyptol made by the cooling process is of absolute purity. Pure Eucalyptol is optically inactive. —G. I. Hudson.

Against ascaridæ in children it is entirely ineffective ; even in small doses to child patients is stated to have caused vomiting and abdominal pains.

Fluidextractum Eucalypti, U.S. 1=1 Hydro-alcoholic percolate. *Average dose.*—30 minims.

Tinctura Eucalypti (Foliorum), B.P.C.

Dose.—15 minims to 2 drachms.

Eucalyptus leaves in No. 20 powder in alcohol 60% 1 in 5.

Hæmorrhage from superficial wounds.—Any form is stated to be stopped by internal use of calcium chloride combined with local application of this tincture.—B.M.J. ii./09,81.

Sterules, Hypodermic, of **Eucalyptus Oil,** 5 minims with **Olive Oil** 12 minims. This injection into the buttocks for bronchitis has given good results. May be increased to Eucalyptus Oil 10 minims, Olive Oil 5 minims.—A French prescription.

Pigmentum Olei Eucalypti et Acidi Salicylici.

Eucalyptus Oil 8, Salicylic Acid 1, Olive Oil to 64.

Eczema capitis cured by this preparation, rubbed into the scalp twice a week, after other remedies had failed. Success attributed to the Eucalyptus Oil. The disease had spread behind the ears and fissures had developed—both meatuses were attacked. The ears were syringed with Carbolic Lotion 1 in 80 and the Eucalyptus Oil applied to the meatus on a pledget of cotton.—B.M.J. i./11,83.

Unguentum Eucalypti et Acidi Borici.

Eucalyptus Oil 40, Boric Acid 120, Soft Petroleum to 500. Lessens secretions of rhinitis.—M. Arch., 1905. 'High Melting' Vaseline preferable in hot weather.

Vapor Eucalypti, T.H.

Eucalyptus Oil 20 minims, Light Magnesium Carbonate 10 grains, Water to 1 ounce. A teaspoonful in a pint of hot water. (**Vic. Park** has double quantity of oil.)

Vapor Eucalypti Compositus, R.F.H.

Eucalyptus Oil 2, Compound Tincture of Benzoin 3, Thymol 1. Spirit of Chloroform to 8. 10 drops at a time to be inhaled through an inhaler, *e.g.*, the 'Ozonic.'

Nebula Eucalypti Composita.

Form A.—Eucalyptus Oil 5 minims, Cinnamon Oil 2 minims, Menthol 12 grains, Liquid Paraffin containing 2% Aristol to 1 ounce. A small quantity sprayed into the nostrils at bed time, and occasionally afterwards if suffering, is said to be a cure for a common cold.

Form B.—Eucalyptus Oil 5 minims, Wintergreen Oil 5 minims, Menthol 5 grains, Liquid Paraffin to 1 ounce.

Eumenthol (T.M. 297687) **Jujubes (Hudson).**

Contain the active constituents of *E. Polybractea* Oil, *Thymus Vulgaris*, *Pinus Sylvestris*, *Mentha Arvensis* with Benzo-borate of Sodium. Antiseptic and effective.

EUONYMI CORTEX.

The Root Bark (*Off.*) obtained from *Euonymus atropurpureus* (*Celastraceæ*), the wahoo or spindle-tree.

Euonymus Atropurpureus should be carefully distinguished from spurious barks. It should show externally longitudinally striated cork and a tangentially striatified liber and delicate threads when gently broken transversely also medullary rays consisting of a single row of cells.—E. M. Holmes, P.J. i./18,88.

Uses.—Possesses tonic, hydragogue cathartic, diuretic, and anti-periodic properties.

Extract of Euonymus (*Off.* and 1898). *Syn.* Eunoymin.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**). **Tablets,** $\frac{1}{6}$, $\frac{1}{2}$ grain.

$\frac{1}{4}$ to 1 grain cholagogue, 1 to 4 grains cathartic.—C.D. ii./07,371.

A brown alcoholic extractive containing calcium phosphate to retain it in the powdered condition. In commerce chlorophyll is sometimes added.

Fr. Cx. has Evonymine Brune, *max. single dose* $1\frac{1}{2}$ grains, max. in 24 hours 3 grains approximately

Pilula Euonymin.

Euonymin 2 grains, Extract of Henbane $\frac{1}{2}$ grain, for one pill; take at bedtime. A cholagogue stimulant, producing no depression or headache ; requires to be followed by a saline aperient in the morning

One grain, combined with 4 grains of Iridin, is a successful purge

Extractum Euonymi Liquidum.

1=1 made with Alcohol (90%) 4, Water 1. *Dose.*—10 to 60 minims (**0·6 to 4 Cc.**). The **Fluidextract U.S.** viii. is similar.

Tincture. *Dose.*—10 to 40 minims (**0·6 to 2·5 Cc.**) 1 in 5 Alcohol 45%.

Liquor Euonymini et Cascaræ. B.P.C.

Dose.—½ to 1 drachm

Liquor Euonymini et Iridini. B.P.C.

Dose.—½ to 1 drachm

Rub Dry Euonymus Extract 3·65 and Iridin 1·83 with Alcohol 45% 50. Filter and add Potassium Carbonate 1·36 in water 25, and make up with Alcohol 45% to 100. Purgative and presumed cholagogue.

Liquor Euonymini et Pepsini (Glasg. Form.).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Euonymin 155 grains, Pepsin Soluble (Scale) 310 grains, Dilute Hydrochloric Acid 340 minims, Alcohol (45%), 6 ounces, Chloroform Water to 20 ounces.

This preparation can be satisfactorily made according to the formula.

FEL BOVINUM PURIFICATUM.

Purified Ox Bile (*Off.*).

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

A dark greenish brown bitter-sweet mass.

Soluble in water and alcohol 90%, insoluble in ether.

Manufactured by evaporating 20 of fresh ox bile to 5, mixing with 10 of alcohol 90%, separating the precipitate and evaporating the clear fluid to thick extract consistence. It is composed of bile salts, cholesterin, lecithin and bile pigments. It is best given in salol-coated pills or '**Stearettes**' containing 5 grains. **Capsules** contain 5 grains each

Uses.—An emulsifier of fat and a stimulant to the action of the liver. Has been given in jaundice and typhoid. A small quantity diluted with water may be used as an enema in obstinate constipation. Pig's gall has also been used. The bile of venomous snakes is said to act as antidote to their poison.

Fel Bovinum Exsiccatum.—*Dose.*—5 to 10 grains in cachets.

Dysentery treated with satisfactory results by rectal injection of 1½—2 ounces of fresh bile of sheep.—I.M.G., Jan., 1907.

In rheumatoid arthritis where *B. Coli* infection is derived from a chronic colitis, ox gall in 10 to 15 grain doses several times daily is one of the most efficient remedies.—B.M.J ii./10,305.

Choleokinase.—A proprietary in capsule form containing bile principles and duodenal ferment. For use in colitis, constipation and jaundice.—L. ii./12,1445.

Pilula Fel Bovini et Fœnu-græci Seminum.—The latter is in Arabic called 'Helba' (*v.* Fœnugreek), employed in diabetes in Egypt.—B.M.J. ii./07,1059. No strength is indicated. We suggest Exsiccated Bile, 3 grains and Fœnugreek 2 grains in each.

FERRUM.

Fe=55·84.

Ferrum Redactum. *Syn.* QUEVENNE'S IRON.

Dose.—1 to 5 grains **(0·06 to 0·3 Gm.).**

Fine powdered iron containing at least 80% (U.S. 90%) metallic iron, prepared by reducing ferric hydroxide with hydrogen.

Incompatible with tannin and metallic salts.

As the human body contains only about 39 grains of iron, to give large quantities, *e.g.*, 6 to 10 grains *per diem* is futile.—H.

Pills of Reduced Iron require $\frac{1}{6}$ to $\frac{1}{3}$ grain Compound Tragacanth Powder to bind them. **Trochisci Ferri Redacti** contain 1 grain.

Ferri Carbonas Saccharatus (*Off.*).

Dose.—10 to 30 grains **(0·6 to 2 Gm.).**

Ferrous oxycarbonate, $x\mathrm{FeCO_3}\ y\mathrm{Fe(OH)_2}$, partially oxidized and mixed with glucose (sugar in '98 B.P.), the mixture containing not less than 50% (B.P. '98 33%) of its weight of ferrous salt if reckoned anhydrous carbonate $\mathrm{FeCO_3}$=115·845.

Incompatible with tannin-containing drugs, also with acids and acid salts.

Ferri Carbonas Saccharatus Concentratus.

Four times as strong as the U.S. preparation, *i.e.*, containing about 60% of Ferrous Carbonate. Can be made by U.S. VIII. method, but adding 5% Glucose at end of the process instead of the 80% of Cane Sugar. Is useful for capsule and pill making.—P.J. ii./05,134.

Uses.—For anæmia and chlorosis of young women. The dose may be increased up to 10 grains daily of Anhydrous Ferrous Carbonate.

Capsules and Tablets of Saccharated Iron Carbonate, contain 5 grains **(0·3 Gm.).**

Pilula Ferri (*Off.*). *Syn.* BLAUD'S PILL.

Dose.—5 to 15 grains **(0·3 to 1 Gm.).**

Each 5 grains contain about 1 grain of Ferrous Carbonate.

When palpitation occurs in connection with anæmia or chlorosis, the frequent employment of iron pills or of powders of reduced iron will probably remove the cause and so allay the symptoms.—Tirard. Med. Treatment, p. 19.

For the original Formula for Blaud's Pill, the Estimation of, and Effects on the Blood, see Vol. II.

Capsules of Blaud Pill each equal to 5 grains of the official pill are also prepared.

Tablets, 4 and 8 grains. *Dose.*—1 to 4 four-grain, or 2 eight-grain Tablets, also made P1 4 gr. with Arsenious Acid $\frac{1}{64}$ gr. *Dose.*—1 to 4.

Capsules are also made in the following combinations:—

Blaud Pill 5 grains with Aloes, $\frac{1}{2}$, or 1 grain.
P1 „ „ 5 grains with Arsenic $\frac{1}{100}$, $\frac{1}{50}$, $\frac{1}{30}$ grain.
„ „ 5 grains with Cascara Extract, 3 grains.
„ „ 5 grains with Cod Liver Oil, $\frac{1}{2}$ dr.—B.M.J.ii./05,1398.
P1 „ „ 5 grains with Nux Vomica Extract, $\frac{1}{4}$ grain.
„ „ 5 grains with Quinine Sulphate, 1 grain.

Ferri Citras U.S. VIII. *Average dose.*—4 grains **(0·25 Gm.).**

Contains ferric citrate corresponding to not less than 16% metallic iron. Garnet red scales with slight ferruginous taste. Soluble in water

Ferri et Ammoni Citras. (*Off.* and B.P. 1898). U.S.

Dose.—5 to 10 grains **(0·3 to 0·6 Gm.).** Yields 31% or 32% ferric oxide. (*Off.*) Contains 16 to 18% metallic iron (U.S.). Dark red scales soluble in about half their weight of water.

The amounts used in the B.P. for making this corresponds to the formula $(NH_4)_3 2FeC_6H_5O_7$. Preparations have been made in which the Ammonium is quantitatively replaced by Lithium, Sodium and Potassium forming neutral products, hence formula assumed to be correct. The alkali (Hydrate Carbonate or Bicarbonate can be used) should be added before the Iron is "nearly dissolved"—the solution of the latter being hot, not cold.—R. C. Cowley, C.D. i./11,315.

Flavoring.—Is practically tasteless.

In ordinary cases of debility and anæmia. Especially preferred in lingering cases of gastric catarrh after alkalies have ceased to benefit and the stomach is not ready for an acid tonic. Also with Sodium Salicylate in subacute rheumatism of children.—B.M.J. ii./08,1145.

Ferri et Ammonii Citras Viridis.

Dose.—5 to 10 grains **(0·3 to 0·6 Gm.).**

Hypodermically ½ grain in solution, but *for this purpose it must be neutralised.*

Sterules ½ **(0·03 Gm.)** and 1 grain **(0·06 Gm.)** in 1 Cc., also 2 grains with 1% Quinine-Urea.

Ferri Hydroxidum cum Magnesii Oxido, *see* Antidotum Arsenici, p. 174.

Ferri Perchloridum. *Syn.* FERRI SESQUICHLORIDUM, FERRUM SESQUICHLORATUM. $Fe_2Cl_6,12H_2O=540·632$.

Ferric Chloride, U.S. Should contain not less than 20% of iron in the form of chloride.

Dose.—2 to 8 grains **(0·12 to 0·5 Gm.).**

Deliquescent yellow masses made by evaporating the stronger official solution and crystallizing.

Incompatible with infusions, &c., containing tannin, with the alkalis, alkaline carbonates, iodides, salicylates and mucilage of acacia. Ferric Chloride with Potassium Iodide in presence of Potassium Citrate produce a Potassium Ferricitrate and hence compatible.—P.J. ii./05,862.

Uses.—A well-known tonic in anæmia and rickets, has astringent action and is a useful styptic (it may be used in the solid form).

In erysipelas large doses of Iron Perchloride Tincture probably aid phagocytosis.—Whitla, Pract. Med.

The perchloride is the most diuretic preparation of iron.—H.

Iron decreases the elimination of uric acid, which may account for the production of headache in rheumatic patients under its influence.—H. Its administration may bring on an attack of gout.—W.W W.

For gastric ulcer, whether deep or superficial, with or without hæmorrhage, the stomach should be emptied by a soft sound. By means of a funnel 100 Cc. of a solution of Ferric Chloride 1 in 1,000 are introduced. This is removed, and the operation repeated till the liquid comes out clear, *i.e.*, usually after about five washings with the solution. 500 or 600 Cc. will usually control even the most severe hæmorrhage, and this is repeated for 4 or 5 days.—Pr Nov. '08,679.

T. H. orders for **Nebula Ferri Perchloridi,** 5 grains and Glycerin 15 minims; for **Pigmentum Ferri Perchloridi** 60 grains to 120 grains of this salt to each ounce of solution.

Glycerinum Ferri Perchloridi, G.H., has Ferric Chloride 1, Glycerin to 5. For use as a paint. Glycerin and chloroform water cover its metallic astringent taste.

Löffler's Pigment for Diphtheria.

Menthol 10, Toluol *q.s.* to 36, Ferric Chloride Solution 4, Absolute Alcohol to 100. To apply on wadding every 3 hours. Painful in use. Dilute Hydrogen Peroxide is preferable.

Diphtheritic throats swabbed with Antitoxin (the patients receiving also injections simultaneously) compared with those swabbed with Loeffler's Solution and other antiseptics showed that those treated with Antitoxin took almost 24 hours longer to clear—which might be expected, as Diphtheria Antitoxin is not bactericidal.—B.M.J. ii./11,163.

'Collapsubes' with rectal tube contain Ferric Chloride 1 in 40 with vaseline basis for piles.

Gossypium Stypticum. *Syn.* GOSSYPIUM FERRI PERCHLORIDI. Saturate Absorbent Wool 85 with Water 100 containing Ferric Chloride 15 and dry. **Linteum Stypticum** is made similarly.

(In **Ph. Ned.** Gossypium Stypticum contains at least 2% Quinine Hydrochloride, and no iron.)

Liquor Ferri Perchloridi Fortis (*Off.*). Contains 20% Fe. Has Sp. Gr. about 1·49. Its yield of Fe_2O_3 is 1·42 Gm. from 5 Cc.

Liquor Ferri Chloridi. U.S. Contains not less than 10 Gm. Fe in 100 Gm

Average dose.—1½ minims (**0·1 Cc.**).

Liquor Ferri Perchloridi (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Contains about 5% Fe. Strong Solution of Ferric Chloride 1, Water to 4.

In septicæmia—in the first 24 hours 4 drachms of the official liquor divided in 12 doses; for the second 24 hours 6 drachms; for the third 1 ounce. All cases were successful.—L. ii./04,1248.

Ringworm treated by first cleaning the scalp with Petrol and apply Strong Ferric Chloride Solution. *Do not wash the head* during the treatment. The patches affected should be treated every second day for three times, afterwards every third day for six times, to generally effect cure. Dab the rest of the scalp occasionally as prophylactic. The iron-stained scurf and epidermis, will in the course of some days, come away from the scalp, leaving a healthy skin beneath.—J. H Garrett, B.M.J. i./13,390

Tinctura Ferri Perchloridi (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A 25% dilution of strong solution of Ferric Chloride with water containing a proportion of Alcohol (14·5 Gm. Anhydrous Ferric Chloride in 100 Cc. approx. U.S. about 13%).

Flavoring.—Syl Aurantii Floris (double dose); Syrupus.

Owing to the fact that ferric chloride does not remove any of the acid of the gastric juice (as when reduced Iron or Blaud's Pills are given), this is preferred by many.

Thread worms are killed by rectal injection of a drachm of the incture in 10 ounces of water.

Angio-neurotic œdema treated with drachm doses repeated if necessary every 20 minutes.—L. ii./08,1359.

Strumous children with tuberculous bone disease, or chronic enlarged glands have been treated with 5 to 10 minims with 10 to 20 minims of solution of mercuric chloride *t.d.s.* given over prolonged periods.

For further uses see Ferri Perchloridum, antea.

Mistura Ferri Aperiens. U.C.H.

Magnesium sulphate 30 grains, ferrous sulphate 2 grains, diluted sulphuric acid 2 minims, peppermint water to 1 ounce. An excellent mixture for the cure of inebriety.

P1 **Mistura Ferri Arsenicalis. U.C.H.**

Citrate of iron and ammonium 8 grains, arsenical solution 5 minims, infusion of calumba to 1 ounce. *Dose* —½ to 1 ounce.

Mistura Ferri Salina. U.C.H.

Potassium citrate 22 grains, solution of ferric chloride 24 minims, chloroform water to 1 ounce. The styptic taste of iron is masked in this mixture, as a double decomposition occurs between the iron and the potash salt.

Liquor Ferri Chloroxidi.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Contains, it is said, a basic ferric chloride of the formula $Fe_2Cl_67Fe_2O_3$.

Strong Solution of Ferric Chloride 4, Distilled Water 40. Mix, and add in excess, Solution of Ammonia, *q.s.*; collect, wash well the precipitate, stir, and dissolve it with a gentle heat in Strong Solution of Ferric Chloride 1, Distilled Water *q.s.*, to make when filtered 20.

Liquor Ferri Dialysatus (B.P. 1885).—S.P. Gr. 1·047.

Dose.—10 to 30 minims (**0.6 to 2 Cc**).

Better tolerated than the strong acid preparations. Contains about 5% Ferric Oxide. To be prescribed as "drops," undiluted, or mixed with glycerin

Glycerinum Ferri Dialysati.

Dialysed Iron Solution 1, Glycerin 2. Keeps well and is palatable. *Dose* —1 drachm (**4 Cc.**).

Dialysed iron is useful as an antidote to arsenic—much superior to the moist peroxide; 1 ounce doses should be given repeatedly, preceded by dose of common salt or sodium bicarbonate, *see also* p. 174.

Ferrum Oxydatum Saccharatum, P. Austr., P.G.V., Saccharated Ferric Oxide.

Dose.—10 to 40 grains (**0·6 to 2·5 Gm.**).

Dilute Ferric Chloride Solution (P.G.) 30 (by weight) with Water 150. Then add with stirring a solution of Sodium Carbonate 26 in Water 150 (towards the end of the precipitation before each fresh addition of the alkali one waits for the re-solution of the precipitate). Wash to free from Chloride, collect on cloth, press slightly, mix in porcelain dish with powdered Sugar 50 and so much Sodium Hydrate Solution (Sp. Gr. 1·17) as is required to dissolve on a water bath (not more than 5 to be used), evaporate and dry and mix with Sugar *q.s* to make 100.

Liquor Ferri Oxydati Saccharati. *Dose.*—½ ounce.

Under this name a solution is sold on the Continent containing about 5% of the above, flavoured with Cinnamon or Vanilla.

Liquor Ferri Pernitratis (B.P. 1898).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A reddish brown solution containing ferric nitrate $Fe_2 (NO_3)_6 = 483·924$ Sp. Gr. 1·107, contains 3·3% Fe. *Uses* similar to those of the solution of the perchloride.

For children in convalescence from prolonged chronic diarrhœa, 1 to 2 minim doses.—B.M.J. ii./08,1146.

Vinum Ferri, U.S. VIII. *Average dose.*—2 drachms (**8 Cc.**).

Iron and Ammonium Citrate 4, Tincture of Sweet Orange Peel 6, Syrup 10, White Wine to 100.

Vinum Ferri Amarum, U.S. VIII. *Average dose.*—2 drachms (**8 Cc.**).

Soluble Iron and Quinine Citrate 5, Tincture of Sweet Orange Peel 6, Syrup 30, White Wine to 100.

ORGANIC IRON COMPOUNDS.

Small doses of some organic preparations of Iron tested against equal doses of the most commonly used and trusted inorganic Salts of Iron. They are absorbed in much greater proportion to the total given per diem. The quantity of Hæmoglobin in the system was found to increase under use of the organic compounds. The data do not appear to be quite satisfactory or comparable. All the patients started with about 70% Hæmoglobin and increased to about 75%, with exception of the Hæmatogen patient, who started with only 45%, and therefore had a lot of road to make up.—B.M.J.ii./11,105.

Triferrin. *Syn.*—Ferri Nucleinas, Ferrinol.

Dose.—15 grains *per diem* after meals in divided doses.

An insoluble powder said to contain 21% of Iron and nearly 3% of Phosphorus. In anæmia and in phthisis.

Liquor Ferri Albuminati (after Dieterich. *Liquids to be weighed*). Is in P. Jap. 1907 slightly modified.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

P.G.V. directs: Mix fresh Egg Albumen 75. rubbed through a sieve with water 2,000 at 50° C and add to Dialysed Iron Oxychloride Solution 50 in water 2,000 at 50° C. in a fine stream. If necessary hasten precipitation by adding Salt 4 in Water 100. Wash thoroughly with lukewarm water and test with Nitric Acid *s.a.* Dissolve p.p. in Sodium Hydrate 15% *w/w* 3, add to the clear liquid Aromatic Tincture 2, Cinnamon Water 100, Alcohol 150, and Water *q.s.* to 1,000. Is easily digested and borne by a delicate stomach.

Use Solution of Ferric Chloride in place of the Oxychloride. This produces a clear preparation.—Am. Jl. Ph., Apl. '08,169.

Liquor Ferri Peptonati (after Dieterich; *Liquids to be weighed*).

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

Dissolve dried egg albumen 10 in distilled water 1,000; add to this pepsin 0·5 and hydrochloric acid 14. Digest the mixture for 12 hours at 40° C. (104° F.); cool and neutralize with solution of soda; then add solution of chloroxide of iron 120 diluted with distilled water 1,000. Again neutralize exactly with diluted soda solution, collect and wash, precipitate free from chloride.

Transfer to a tared bottle and dissolve in hydrochloric acid 1·17, warming slightly, add simple syrup 10, compound tincture of cinnamon 10, alcohol (90%) 150, and distilled water to 1,000. This solution is clear by transmitted light but opaque by reflected light.

Ferrum Peptonatum in scale form can be produced by digesting egg albumen with pepsin and dilute hydrochloric acid at 39° C. The peptone solution is neutralised and added to solution of chloroxide of iron. The precipitated peptonate is dissolved in water with a little hydrochloric acid—the solution is evaporated and 'scaled' in the customary manner.

✱**Hemaboloids** (T.M. 257438).

Dose.—½ ounce (**15 Cc.**) after meals. Children in proportion.

A proprietary preparation stated to contain iron derived from vegetable nucleo-proteids (½ ounce being equivalent to 20 minims of the Tincture of Perchloride of Iron, B.P. '98) with beef peptone, bone marrow extract and nuclein Does not constipate or disturb digestion in anæmia and convalescence.

☞ Also made **P1** **with Arsenic** 1/40 grain (Arsenious Acid) and **Strychnine** 1/80 grain in the ½ ounce dose. Combined hæmatinic nutritive and tonic.

Ferri Sulphanilas. $(C_6H_4.NH_2.SO_3)_3Fe = 572·284$.

Iron Sulphanilate has been introduced under the name ***Ferrivine** (T.M. 371090) or "FERRI-TRI-*p*-AMINO-BENZENE SULPHONATE."

Dose.—Intravenously 100 Cc. containing 1 Gm. of the compound diluted with water before use.

This aqueous solution is stated to contain the iron in 'colloidal' form; acid in reaction; does not 'oxidise' when exposed to the air and will stand boiling; 100 Cc. bottles are supplied. When given intravenously Ferric Hydroxide is found on account of the alkalinity of the serum.

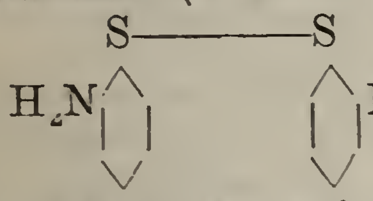
Uses.—In syphilis in conjunction with Intramine. In the early stage Ferrivine is to be given first; in the latter stages Intramine.

We think it is only right to issue a word of caution regarding these two preparations. Mr. McDonagh himself in his papers has drawn frequent attention to the pain caused and other sequelæ.

Briefly, the theory of J. E. R. McDonagh (the introducer of this substance and Intramine) is as follows:—

He claims that Salvarsan does not attack syphilitic organisms directly but that it becomes attached to certain 'lipoid-globulin' molecules of the serum of the host which by chemico-physical action ("adsorption") kills the parasites. (He holds that Ehrlich's chemo-therapy is entirely erroneous.) For this to take place, active oxygen, which is normally formed directly by peroxidases and indirectly by perhydridases is requisite. Metals act as peroxidases and "Ferrivine" is a body suitable for injection which acts better than arsenic and is not toxic. Red blood-corpuscles supply the tissues with oxygen in an active state, the action being largely due to the presence of iron in the hæmoglobin, which constitutes the principal solid ingredient of the red corpuscles. It is claimed that iron is the metal which normally acts in the body as an oxidising agent, and in early syphilis oxidation is more to the fore than reduction; the opposite is the case in the later stages. McDonagh therefore endeavoured to determine how the reducase system worked and to find a compound with the same action as Aluminium, Iron and Arsenic effect in the oxidase system. The perhydridase he found is a disulphide protein and sulphur (a non-metal) is the catalyst. Of numerous sulphur compounds Intramine had the greatest therapeutic effect.—B.M.J. i./16,202, 593; C.D. i./16,472.

***Intramine.** (T.M. 370133). *Syn.* DI-ORTHO-AMINO-THIO-BENZINE.



$= 248·296.$

Dose of the **Cream** form:—2½ Cc. to be injected intramuscularly into each buttock repeated as desired. Smaller dose may also give benefit. It is supplied in 5 Cc. ampoules.

Intravenously:—20 to 100 Cc. of 0·1% *Emulsion.*

Manufacture.—Originally made by B. Hofmann, 1879 and 1887 by oxidising o-amino-phenyl-mercaptan with Ferric Chloride. K. Hofmann, 1894, made it by heating aniline and sulphur.

Solubility. — Soluble in ether, alcohol and acetone. Insoluble in water.

Description.—An organic amino compound in pale yellow crystals first prepared for therapeutic use in the form of a sterile oily cream, now in 0·1% colloidal aqueous suspension or emulsion. This form is more readily absorbed.

Uses.— For syphilis and other protozoal diseases and possibly for chronic bacterial diseases, *e.g.*, tuberculosis and leprosy. According to McDonagh it is capable of destroying the phases of the leucocytozoon syphilidis (his name for the syphilis organism) which Salvarsan does not.

All intramuscular injections of the Cream form of the substance are apt to be painful. It should be well warmed before use. Patient should be well massaged after the injection has been given. He should walk about to aid absorption and the moment stiffness begins he should have a very hot bath containing some soda: these to be repeated during the next two or three days.—L. i./16,1033.

Intramine acts as a complement to any metallic compound, *e.g.*, Ferrivine, and has caused syphilitic lesions to disappear which have been aggravated by Salvarsan or not responded to it.—McDonagh, L. ii./16,121.

Prof. Bayliss, B.M.J. ii./16,273, has criticised McDonagh's work at considerable length—this letter should be carefully studied.—He states that whatever the "lipoid-globulin particles" may be they are not an "oxidase-reducase system," and he has grave doubts as to their having any importance whatever. The assumption that oxidation and reduction play a part in the action of syphilitic remedies is founded on this and equally devoid of evidence. For McDonagh's reply see B.M.J. ii./16,340.

McDonagh's 'Rationale of Chemotherapy' in syphilis—introduction of Intramine. The biggest single dose given to a human being was 12 Gm. without untoward symptoms. In the recurrent stages it is superior to Salvarsan. Useful in enhancing action of Galyl by intramuscular injection.—L. i./16,236,297,736.

Hunterian Lectures 'Links in a Chain of Research on Syphilis.'—L. i./16, 981,1025,1277.

Re intravenous form of Intramine.—L. i./17,914.

The use of compounds containing Arsenic, Antimony and Silver—the only metals which have a strong bacteriological action *in vitro* but not *in corpore*—is playing with fire because the greater the bactericidal action a metal has the more toxic it is.—J. E. R. McDonagh, L. ii./16,657.

It is thought that the role of Arsenic (in Salvarsan) is essentially that of a catalyst—a peroxidase to increase the protective powers of the host. Salvarsan acts it is thought by increasing the amount of active oxygen in the serum thereby increasing resistance of the host. That the action is not parasitotropic is shown by the fact that experiments with other metals, notably Aluminium and Iron, show that even more potent compounds of this kind can be made. Intramuscular injections frequently produce pain with rise in temperature and malaise, 13 cases.—H. Spence, L. i./16,861.

Criticisms of Ferrivine and Intramine. Syphilitic cases (ordinary early cases) treated with the former behaved as if no specific treatment of any kind had been received. As to side effects there were great collapse and respiratory distress. Intramuscular injection with the Intramine was undiluted torture. Local symptoms, swelling and tenderness persisted for weeks. In one case abscess formation and in another necrosis.—Lieut.-Col. Harrison and C. H. Mills, L. i./16,1214. Lupus showed improvement.—Arthur Shillitoe, B.M.J. i./16,820.

Seborrhœic eczema treated by 1 Cc. of Intramine intramuscularly. 7 days later 2 Cc. Colloidal Manganese was given and repeated twice at weekly intervals. The condition cleared up.—W. Habgood, B.M.J. ii./18,76.

Liquor Ferri Peptonati cum Quinina.

Dose.—1 to 4 drachms (4 to 15 Cc.)

Contains ½% of Quinine Hydrochloride.

Elixir Ferro-Manganesii Peptonati.

Dose.—1 to 4 drachms **(4 to 15 Cc.)**.

Contains, in addition to Iron, 0·1% of Manganese.

This preparation is now revised. It is a useful hæmatinic and palatable. It replaces the Liquor in past Editions.

Liquor Ferro-Manganesii Peptonati cum Hæmoglobin (5 grains in the drachm)—suspended, will not dissolve to this extent.

Also **Liquor Iodo-Ferro-Manganesii Peptonati** [0·1% Iodine in combination ($\frac{1}{16}$ grain per drachm)].

In anæmia and chlorosis as 'tonics.'

Extractum Ferri Pomatum is prepared by digesting iron filings in juice of sour apples. P. HUNG. and P.G.V. give method of making. That of P.G. contains 5% iron.

Tinctura Ferri Pomata, P.G.V.

Dose.—15 to 30 minims **(1 to 2 Cc.)**.

Ferrated Extract of Apples 1 part, Cinnamon Water (P.G., containing 10% of alcohol) 9 parts.

Liquor Ferri Acetatis (B.P. 1898).

Dose.—5 to 15 minims **(0·3 to 1 Cc.)**.

This solution does not decompose iodides.

Pneumonia treated with full doses every six hours until crisis past.—B.M.J. i./05,1024, C.D. i./05,756.

Liquor Ferri et Ammonii Acetatis, U.S. BASHAM'S MIXTURE.

Average dose.—4 drachms **(15 Cc.)**.

Tincture of Ferric Chloride 4. Dilute Acetic Acid 6, Solution of Ammonium Acetate 50, Aromatic Elixir 12, Glycerin 12, Water to 100 (was 2 Cc. in 100 Cc in 1890, U.S.P.). To be freshly made. Particularly useful in anæmia and chronic parenchymatous nephritis. It acts as a good diuretic and diaphoretic.—H.

In albuminuria, especially towards end of an acute attack of Bright's disease, when the albumin is slow to disappear.—B.M.J. ii./08,1146

Ferri Iodidum. $Fe\ I_2 = 309·68$.

Dose.—1 to 5 grains **(0·06 to 0·3 Gm.)**.

Crystalline brown hygroscopic masses readily soluble in water.

Manufacture.—The method given in some text-books to heat the iron in a fine state of subdivision and to add the Iodine in portions in quantity slightly in excess of theory and to drive off the excess at the finish is most unsatisfactory. It is much better to employ a wet process, *e.g.*, to combine Iron 6 and Iodine 7 in water *q.s.*, filter and evaporate to dryness. In this method the iron is kept in excess.

Clean Iron Filings previously washed with acid if oxidised are preferable either to Reduced Iron or Iron Wire.

Mostly prescribed as one of the following :—

Syrupus Ferri Iodidi (*Off.*).

Dose.—½ to 1 drachm **(2 to 4 Cc.)**.

Contains Anhydrous Ferrous Iodide 5% w/w approx. F.I. requires this. 10 Cc. contain 0·7 Gm. FeI_2. It also contains now 10% of Glucose.

For suggestions as to method of making and preservation of the Syrup, see Vol. II.

Incompatible with Sal Volatile and with Easton's Syrup—strychnine iodide, and perhaps quinine iodide thrown out.—P.J. i./05,263,268.

Capsules are prepared equivalent to 10 and to 30 minims.

Rheumatoid arthritis well treated by.—H. W.

Exophthalmic goitre and rheumatoid arthritis treated with Iodide of Iron and Arsenic, also previously with sodium salicylate, belladonna (improved under), guaiacum and ferrous iodide.—L. ii./08,1877.

Syrup of Iodide of Iron with Easton's Syrup mixed together precipitate in time, whether as such or diluted, but if both be made with glycerin they are compatible as such, but precipitate on dilution. But if a trace of hypophosphorus acid be added to the ordinary Syrup of Iodide of Iron they do not cause precipitation.—P.J. ii./09,389.

Liquor Ferri Iodidi. *Dose.*—4 to 8 minims **(0·25 to 0·5 Cc.).**

A solution for diluting 1 to 7 with Syrup to produce the above.

Suggested formula containing Hypophosphorous Acid (30%) 140 Cc. and Glycerin 100 Cc. per litre as preservatives.—G. M. Beringer, Am. Jl. Ph., May, 1913.

Ferri Iodidum Saccharatum, U.S. 1890.

Dose.—2 to 15 grains **(0·12 to 1 Gm.)**

Combine Iron Wire 6, Iodine 17, in Water 20, when complete filter on to milk sugar 40, and Reduced Iron 1, previously mixed. Evaporate to dryness and add milk sugar, *q.s.* to 100. This and a similar preparation of P. Jap. contain about 20% FeI_2.

Uses.—An exceedingly useful tonic, especially in arthritis, anæmia and phthisis. May be ordered in form of cachet.

Acute goitre treated by Syrup of Iodide of Iron and Potassium Iodide with Iodine paint. Tracheotomy ultimately performed.—L. ii./08,1215.

Pilula Ferri Iodidi (**B.P.**, 1885).

Dose.—3 to 8 grains **(0·2 to 0·5 Gm.).**

Shake carefully in a stoppered bottle Iodine 80, Water 46, with Iron Wire 40; add decanted Solution to Sugar 70; mix and combine with Liquorice Powder 140. In dividing this into pills, roll them in a mixture of reduced iron and lycopodium, and varnish.

P1 **Pilula Garrodii, N.H.W.**

Pill of Ferrous Iodide 2 grains, Exsiccated Sodium Arsenate $\frac{1}{36}$ grain, Extract of Belladonna $\frac{1}{12}$ grain.

Ferri Oxalas, $Fe\,(COO)_2\;2H_2O = 179{\cdot}882$. *Syn.*—Ferrous Oxalate, Protoxalate de Fer. **F.E.** and **P. Hung.**

Dose.—1 to 5 grains **(0·06 to 0·3 Gm.).**

Yellow crystalline powder, insoluble in water but soluble in dilute acids. Has been given in anæmia and as a nerve tonic.

Ferri Phosphas Saccharatus. Saccharated Iron Phosphate (*Off.*)

Dose.—5 to 10 grains **(0·3 to 0·6 Gm.).**

An amorphous powder containing at least 60% of ferrous salts calculated as $Fe_3(PO_4)_2,\ 8H_2O = 501{\cdot}728$. B.P. '98 was 47% and not saccharated.

Ferri Phosphas Solubilis, U.S., is a green soluble sodio-citro-ferric phosphate. Contains Ferric Phosphate corresponding to 12% metallic iron.

According to Squibb the following gives a green salt. Dilute Iron Tersulphate solution 135 Gm with water 300 Cc. Pour this rapidly, with constant stirring, into Caustic Soda, U.S. 50 Gm; dissolved in water 300 Cc. in a vessel of 2,000 Cc. capacity.

Decant and wash thrice. Drain off most of the water and add the magma gradually to Citric Acid 55½ Gm. and Sodium Phosphate 76 Gm. in just sufficient cold water to dissolve. Allow to stand 24 hours at about 60° C. to dissolve and filter. Concentrate at not exceeding 60° C. and scale without heat.—P.J. ii./09,405.

Ferri Pyrophosphas Solubilis, U.S. VIII.

Contains ferric pyrophosphate corresponding to not less than 10% metallic iron. *Average dose.*—4 grains.

Syrupus Ferri Phosphatis (*Off.*).

Dose.—½ to 1 drachm (**2 to 4 Cc.**). One drachm contains 1 grain of anhydrous ferrous phosphate. Keep in bottles quite full.

Syrupus Ferri Phosphatis Compositus, B.P.C. *Syn.* CHEMICAL FOOD; PARRISH'S SYRUP (*modified*). *Dose.*—½ to 2 drachms.

Iron Wire, free from oxide 37½ grains. Concentrated Phosphoric Acid, Sp. Gr. 1·5, 1 ounce, Distilled Water 5 drachms. Place in a glass flask, so that the liquid completely covers the wire, plug with wool, and heat gently till dissolved.

Mix Precipitated Calcium Carbonate 120 grains, Concentrated Phosphoric Acid 4 drachms, Distilled Water 2 ounces, and add Potassium Bicarbonate 9 grains, Sodium Phosphate 9 grains. Then add the solution of phosphate of iron, filter and set aside.

Boil Cochineal 30 grains with distilled water 7½ ounces 15 minutes, cool and filter, pouring over the filter sufficient water to produce 7 ounces. To this add refined sugar 14 ounces.

Heat till dissolved and strain. When cold, add the solution of phosphates, Orange Flower Water 1 ounce, and sufficient water to measure 1 pint.

Cudbear is better than Cochineal. Mix with an equal quantity of clean sand and percolate.—F. Goldby, P.J. i./15,576. The addition of orange flower water to the original formula has made the final volume incorrect.—*ibid.*, 518.

Contains in each drachm ½ grain Iron Phosphate and ⅘ grain Calcium Phosphate with small quantities of the phosphates of potassium and sodium. It should be kept in bottles quite full. A small proportion of glucose added, assists keeping qualities. It is not too nauseous to administer to children, for whom it is frequently prescribed.

One drachm doses, thrice daily, with increasing doses of cod liver oil, for "recurrent" abortion.—M.A 1904,99.

For estimation of Iron and Calcium in this Syrup, see Vol. II.

Capsules of Chemical Food are each equivalent to 1 drachm.

Ⓟ **Syrupus Ferri Phosphatis cum Quinina et Strychnina.** (*Off.*). *Syn.* EASTON'S SYRUP, SYRUPUS TRIUM PHOSPHATUM.—G.H.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).—One drachm represents 1 grain of anhydrous ferrous phosphate, ⅘ grain Quinine Sulphate and $\frac{1}{32}$ grain Strychnine. As this Syrup becomes discoloured it is more satisfactory to make only small quantities at a time. Sp. Gr. approx. 1·290.

The acid liquor is officially filtered into the syrup, and afterwards made up to a pint. If the solution is made up to *about* 6 *ounces* filtration is much *more rapid* and exposure to air less.—C.D. i./05,464.

Equal parts of glucose syrup and syrup produce a preparation—with much better keeping qualities.—C.D. i./05,709. A sample made by us by this modification was under observation for four months, at end of which time it was clear, and had not turned brown. But similarly, a batch of Easton's Syrup during the same time had not materially darkened.

The original formula was published in Aitken's Practice of Medicine vol. ii., p. 62, 5th ed. U.S. VIII. employed Ⓟ Glyceritum Ferri, Quininæ et Strychninæ Phosphatum 25, *q.v.*, Syrup to 100. *Average Dose.*—1 drachm.

(Easton's Syrup has been dismissed from the U.S.P.)

Flavoring.—One drachm requires Syl Aurantii Amari 2 or 3 drachms and water to 1 ounce (or less). Extractum Glycyrrhizæ Liquidum covers, but not so good as Syl Aurantii Amari.

It improves the coagulability of the blood. The excess of acid in this Syrup is said to be injurious to the teeth.

With Syrup of Iodide of Iron (*q.v.*) also made with Glycerin is compatible in the concentrated form, but not if diluted.—P.J.ii./09,389.

Ⓟ **Liquor pro Syrupo Eastoni.** 3 with 7 of Simple Syrup= **Easton's Syrup** (*i.e.*, 144 minims with Simple Syrup *q.s.* to 1 ounce).

Add to a Solution of Ferrous Phosphate 5 ounces (produced by dissolving Iron Wire 150 grains in Phosphoric Acid, Sp. Gr. 1·5, $2\frac{1}{4}$ ounces and water *q.s.* to 5 ounces), **Liquor Eastoni sine Ferro** 7 ounces (made by dissolving Strychnine 10 grains and Quinine Sulphate 260 grains in Phosphoric Acid warmed, 2 drachms and adding water *q.s.* to 7 ounces). Is better recently prepared. The Solution of Ferrous Phosphate keeps for a moderate time in stoppered bottles, which should be as full as possible to prevent exposure to the air.

Liquor Eastoni sine Ferro.—Some recent protracted experiments by us showed that this Liquor can be kept almost colourless by using Sulphurous Acid (5%) in proportion of 1 minim in 3 ounces. This is better than Hypophosphorous Acid, which has been used by some. The bottle must be kept stoppered, *i.e.*, air must not have access to the Liquor.

Hypophosphorous Acid and Sulphurous Acid must not be used together.

Easton's Syrup in Two Syrups.

(*a*) Mix Liquor Ferri Phosphatis 5 with Syrup *q.s.* to 20.

(*b*) Mix Liquor Eastoni sine Ferro 7 with Syrup *q.s.* to 20.

These keep well separately. Mix at time of dispensing.

Ⓟ **Syrupus Triplex.** Understood to mean a mixture of equal parts of Easton's, Fellows' and Parish's Syrups. **Edin. Royal Infirmary** has 1, 1 and 2 respectively.

Physicians should specify in prescribing which formula is intended.

Ⓟ **Elixir Ferri Phosphatis cum Quinina et Strychnina.**—*Martindale. Dose.*—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

The same strength as the official Easton's Syrup. Prepared with Simple Elixir ('94) in place of Syrup as a vehicle.

Easton's syrup has its equivalent dose in the following pill, which is portable, tasteless, and readily soluble:—

🄿1 **Pilula Ferri Quininæ et Strychninæ Phosphatum.** EASTON'S PILLS.—*Martindale.*

Contain Ferrous Phosphate and Quinine Sulphate of each 1 grain (**0·06 Gm.**), Strychnine $\frac{1}{32}$ grain (**0·002 Gm.**), Milk Sugar $1\frac{1}{4}$ grains (**0·08 Gm.**), Concentrated Phosphoric Acid *q.s.*

Mix quickly, having first triturated the Strychnine with the Milk Sugar and prepare the pills. Finally varnish with Sandarach Varnish. Also made one-half this strength. Either may be combined 🄿1 with Arsenious Acid, $\frac{1}{60}$ grain (**0·001 Gm.**).

Ⓟ **Glyceritum Ferri, Quininæ et Strychninæ Phosphatum.** **U.S. VIII.** *Syn.*—**Glycerole-Easton.**

A substitute for the syrup for administration where sugar is not desirable. It keeps better than the syrup and is palatable.

Average dose.—15 minims (**1Cc.**) containing approximately Soluble Ferric Phosphate 1¼ grain (**0·08 Gm.**), Quinine as Phosphate 1½ grain (**0·1 Gm.**), Strychnine base $\frac{1}{60}$th grain (**0·001 Gm.**)

₱1 **Tablets of Easton's Syrup** are each equivalent to ½ and 1 drachm of the syrup. (Sugar coated.)

₱1 **Capsules** equivalent to ½ and 1 drachm of Easton's syrup are also prepared and each **combined** ₱1 **with arsenic $\frac{1}{50}$ grain.**

₱1 **Pilula Trium Phosphatum, G.H.** Is similar to our Formula for Easton's Pills.

Ferri Sulphas (*Off.*), $FeSO_4, 7H_2O = 278·012$. **Ferrous Sulphate.** *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

In clear, pale, bluish green crystals, soluble 1 in 1½ of water.

A saturated solution with some crystals of the salt in excess keeps better than a weak solution, in the latter oxidation soon takes place.

Flavoring.—Glycerin or Syrup.

Relieves anæmia more thoroughly than carbonate or phosphate.—1% solution of Ferrous Sulphate prevented development of ankylostoma ova and all died in 24 hours.—L. i./10,355.

Ferri Sulphas Exsiccatus (*Off.*). *Dose.*—½ to 3 grains (**0·03 to 0·2 Gm.**). 5 grains = 8 of the above.

Best administered in pill, as:—

Pilula Ferri Sulphatis 3 or 5 grains, with syrup *q.s.* Dissolving slowly, these pills do not derange the stomach. If made with lanolin or kaolin ointment as excipient will not crack.

Liquor Ferri Subsulphatis, U.S. Monsel's Solution.

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**).

A solution of basic ferric sulphate. When evaporated and scaled forms **Monsel's Salt** or **Ferric Subsulphate** $Fe_4O(SO_4)_5$.

A spray of 20 grains to the ounce checks hæmoptysis, and internally is not irritating although astringent.

Unguentum Ferri Persulphatis.—Ferric Sulphate 10 grains, Almond Oil ½ drachm, Conium Ointment to 1 ounce.—Prov. Hosp. (General Hosp., Notts.).

The name Persulphate may be taken to mean normal **Ferric Sulphate** $Fe_2(SO_4)_3$ as contained in Liquor Ferri Tersulphatis, U.S.

Ferri et Magnesii Sulphas. $FeSO_4MgSO_4,6H_2O=380·376$.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

A double salt containing about half its weight of each sulphate; green crystals, soluble 3 in 4 of water.

In 10-grain doses has no astringent or aperient action, hence suitable for prolonged use in chlorosis and anæmia.

Ferri et Manganesii Citras.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**).

In reddish scales, freely soluble in water. Useful in chlorosis, combining the action of the two elements.

Ferro-Alumen. **Iron Alum.**—*Syn.* FERRIC AMMONIUM SULPHATE. $FeNH_4(SO_4)_2+12H_2O=482·194$.

Dose.—3 to 10 grains (**0·0 to 0·6 Gm.**) Amethyst-coloured efflorescent crystals, of styptic taste. *Soluble* 1 in 3 of water (best with a little sulphuric acid added), insoluble in alcohol. Internally to arrest hæmorrhage, also as an astringent gargle (2%), throat spray or pigment.

Ferri et Potassii Tartras. (*Off.*) FERRUM TARTARATUM, 1898

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Reddish brown scales soluble in water about 1 in 1. Prepared by evaporating a solution of Ferric Hydroxide in Acid Potassium Tartrate. 10 Gm. incinerated yield not less than 3 Gm. of Residue.

Menorrhagia of young females is well treated by this tartrate.

For mucous disease, this or the Ammonio-Citrate with alkali in Calumba Infusion.—B.M.J. ii./'08,1145.

Tinctura Ferri Tartarata.—Ferrous Sulphate 8, Potassium Bitartrate 4, Distilled Water 30. Digest 24 hours in a covered vessel, then add Alcohol 68% 70, stand one hour and filter.—Hager, i./1151.

Ferri et Ammonii Tartras U.S. VIII. *Average Dose.*—4 grains. Contains not less than 13% metallic iron.

Molybdenum (Mo=96·0). This metal is found chiefly as its Sulphide **Molybdenite** MoS_2. It is employed for hardening steel. Unlike ordinary Carbon Steel Molybdenum Steel has the property of retaining its temper even when heated to a high degree, hence cutting tools made with it are able to make deep cuts at high speed—the steel may in fact be heated to dull redness without impairing its quality. It has Sp. Gr. 8·6.

FILIX MAS.

The rhizome of *Dryopteris* (*Aspidium*) *Filix-mas.* The Male Fern.

Acidum Filicicum. *Syn.* **Filicic Acid, 'Crude Filicin.'**

Dose.—6 to 15 grains (**0·4 to 1 Gm.**)

A white, tasteless, amorphous powder, soluble in alcohol, oils, and alkalis, insoluble in water. Is the active principle of male fern as an anthelmintic.

A crystalline compound of formula $C_6H_3.OH.(O.C_4H_7O)_2=266{\cdot}214$ is also made, but is regarded as inactive.—*c.f.* Vol. II.

Oleoresina Aspidii, U.S. prepared by ether percolation, is directed to be thoroughly mixed before use, a granular crystalline substance usually deposits. The yield is as much as 18%.—Caspari. *Average Single Dose.*—30 grains (**2 Gm.**) once a day.

Extractum Filicis Liquidum (*Off.* and B.P. '98).

Dose.—45 to 90 minims (**3 to 6 Cc.**).

Prepared by ether extraction—the yield being about 9 to 10%.

Assay and methods for detecting adulteration of, vide Vol. II.

Flavoring.—The taste of this preparation is horrible. Best prescribed as capsule, or if in a mixture or draught best ordered with Mistura Amygdalæ, with perhaps a little Essential Oil, *e.g.*, Cinnamon.

For all varieties of tapeworm and the *ankylostomum duodenale* may be administered fasting. in capsules, or emulsified with about half its weight of compound tragacanth powder. This and the anthelmintics below should be preceded and followed by a dose of some brisk purgative. The extract is best recently prepared.—B.M.J.E. i./06,64. Cured threadworm.—B.M.J. i./07,604 *See also* L. i./10,386

For tape-worm.—Light food at tea time—purgative at bedtime (Magnesium Sulphate and Jalap suitable), purgative again in morning after action give vermifuge. Liquid Extract of Male Fern 1 drachm, Mucilage of Acacia 1 drachm, Cinnamon Water to 1 ounce. After passage of the worm give Castor Oil to remove remaining vermifuge from the bowel.—C.D. ii./10,122. N.B.—We do not consider Castor Oil ideal for the purpose. At any rate, it is not advised *before* or *with* a Filix Mas preparation.

Yeo mentions Capsules of 7½ minims of Male Fern Extract with 1 grain of Calomel. Sixteen of these are taken for a dose—two every ten minutes.

Male Fern Extract (40 minims in an ounce of milk flavoured with Peppermint Oil, 2 minims) must be given on an *empty* stomach. An aperient, magnesium sulphate or sodium sulphate, should be taken first in a good quantity of water (8 to 10 ounces).—B.M.J. i./17,624.

Tuberculous conditions are stated to benefit under treatment with eher-alcohol extract of fresh plant. Children to receive ¾ grain, adults 1½ grains, in pills, twice daily for 10 to 15 consecutive days each month.—Nouv. Remédes/08,24,121 per P.J. ii./08,260.

Distomiasis (Liver-rot) in sheep and cattle is effectually treated by the Extract.

Capsules contain 15 minims (**1 Cc.**) of Liquid Extract. *Dose.*—1 to 4.

We learn from Dr. Wakeman that the tape worm is rife in Abyssinia. All the natives suffer from it. They drink cold infusions of Kousso but this seldom brings away the head of the worm—hence they are obliged to dose themselves to bring away the segments which are formed. They much prefer Male Fern capsules when they can get them—these act effectively especially when followed by 1 to 2 drachms Compound Jalap Powder, but the capsules are too large and the ether in the extract causes eructations (it should not be there—W.H.M.). **Pills** and **Tablets** containing 3 minims of Male Fern Extract are suggested. These are of convenient size—three or four for a dose.

Haustus Filicis Maris, L.H. Liquid Extract of Male Fern, 1 drachm; Syrup of Ginger, 1 drachm; Tincture of Quillaia, ½ drachm; Peppermint Water to 1 ounce.

Mistura Filicis, U.C.H. *Dose.*—1 ounce.

Liquid Extract of Male Fern 1 drachm, Powdered Acacia 1 drachm, Chloroform Water to 1 ounce.

N.E.H. has Liquid Extract of Male Fern 30 minims, Syrup of Ginger 10 minims, Tincture of Panama Bark 20 minims, Water to ½ ounce. To be freshly made. Dose for a child of 4 years of age.

Other tæniacides are **Kamala** (discarded from B.P.), the glandular red powder attached to the capsule of *Rottlera tinctoria*; *Mallotus Philippinensis* (*Euphorbiaceæ*); this may be given in dose of 30 to 120 grains suspended in water; **Cowhage, Dolichos pubes,** the hairs adhering to the pod of *Dolichos* or *Mucuna pruriens* (*Leguminosæ*), *dose* 1 or 2 grains in treacle or honey; **Papain,** and **Thymol**

Carbonate, *q.v.*, but the most efficient tæniacide is **Pelletierine Tannate,** *q.v.*

Toxicology of Filix Mas. A case seriously affected.—L. i /11,109.

Poisoning from use of Male Fern Extract in Castor Oil—the case was actually Addison's disease and not parasitic infection.—B.M.J.E. i./15,44.

GELATINUM (*Off.*). U.S.

Nearly colourless transparent sheets or shreds made by extracting animal tissues, bones, etc., with boiling water.

Skin Gelatin is the best. It is more pliable and possesses more 'fibre.' This variety is suitable for gelatin capsule making. Bone gelatins made from **Osseine** (acidulated bone) are brittle and hence unsuited.

Dose.—Ad libitum *per os*, and injected.

Tubes of Sterile Concentrated Saline Gelatin Solution are prepared for injection into the gluteal region as a hæmostatic; each makes a 2% solution on dilution with boiled water to 5 ounces—sufficient for one injection at 103° F. Injections of this amount are made every third day in the flank or buttock until 30 or 40 injections have been made.

These tubes constitute the great standby in treatment of hæmoptysis of tuberculosis.—English's System of Treatment, vol. i., 1154.

G. W. Davis (Lancet, Sept. 8, 1900) employed 6 ounce subcutaneous injections of 1% Gelatin with Cerebos Salt 0·3% approximately in the treatment of hæmorrhage.

The solution is sometimes used stronger, *e.g.*, 10%.—*i.e.*, the contents of the tube to be diluted to 1 *ounce* (30 Cc.). This would appear too strong for general use.

Gelatina Soluta Sterilisata, P. Helv. Is 10% in Normal Saline. The utmost precautionary directions are given, including animal experiments, to exclude organisms of malignant œdema and tetanus.

Uses.—To check bleeding from the lungs, from the intestines in typhoid and dysentery, from the bladder and from the stomach in ulcer and cancer of that organ. These injections may be followed by pain, fever, local swellings and nettle rash. Other hæmostatics may be combined with it.

Aortic aneurism is relieved by subcutaneous injection of the solution. May be used with impunity. Favourable results.—B.M.J. i./11,561.

A case of purpura hæmorrhagica cured in three weeks by means of enemata of 6 to 10% solution.—M. 02,71. Also for hæmoptysis. ½ pint of solution gave satisfactory results.—B.M.J. i./05,68.

Secondary hæmorrhage well treated. Blood which ordinarily coagulates in 7 minutes clots in 3 minutes after an injection. Dose is about **5 Gm.** in a 1% solution. Very useful in cases of ruptured tubal pregnancy.—L. ii /08,1782.

Intrathoracic aneurysm. The Gelatin Injection treatment was introduced by Lancereaux in 1904. The solution he advised consists of Gelatin 25, Sodium Chloride 7, in Water 1,000 (=2·5%). He injects 200 Gm. at a time and repeats every 4 or 5 days. Sir J. K. Fowler begins with 50 Cc. of 2% Solution and gradually increases to 100 Cc. and 4% respectively. Guthrie Rankin says the relief of pain is striking.—F. De Havilland Hall, L. i./13,947.

It is the most powerful *protein-sparer* known, being able to save from destruction half its weight of proteid or twice as much as is spared by an equal quantity of carbohydrate One gramme yields about 4·1 Calories.—R. Hutchison

For gastric ulcer gelatin is very easily digestible. It 'fixes' a great deal of acid. Though not a true substitute for protein it is a very powerful protein sparer. A diet of gelatin, fat and sugar has been advised.—Pr. Nov '08,679.

For infantile diarrhœa, with food.—B.M.J.E. ii./03,59.

Intestinal bleeding arrested by administration by the mouth.—M.A. 1908,17.

Snake bite: Oozing hæmorrhage due to this occurs from all mucous membrane well treated by large quantities of 5% Gelatin Solution *per os.*—B.M.J. i./15,632.

Gelatin Solution 5 to 10% containing 5% Calcium Chloride. To arrest hæmorrhage.—*Vide* **Calcii Chloridum,**

Formalised Gelatin.—This has been used with success as a substitute for Collodions. Gelatin Solution 10% in water is stored in wide mouth test tubes holding three ounces each. The tubes are plugged with cotton wool and sterilised at 100° C. for 15 minutes on three successive days. When required for use melt in a water bath and add 1 drachm of Formalin Solution diluted 10 times—*i.e.*, 4% strength of Formaldehyde approx.—the final product will then contain a little over 1% of Formaldehyde (H.COH) or fully 2½% of Commercial Formalin.

The wound is dressed with a thick roll or pad of sterilised gauze, with a piece of stiff gauze above extending beyond the wound. The Formalised Gelatin is applied with a swab on the top of the stiff gauze beyond the limit of the wound,—this holds the dressing in place without bandage.—Communicated by the Dispenser, General Infirmary, Leeds.

For **Formalised Gelatin Capsules** *vide* Formagules.

∗ **Vernisol** (T.M. 221492).—A water-soluble varnish, a preparation in form of a jelly which dries and leaves a transparent, flexible coating, non-irritating, and may be medicated with the usual dermatological agents.

GELSEMII RADIX. (*Off.*). U.S.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) *N.B.*—U.S. gives ½ grain only as average dose.

The dried rhizome and roots of "yellow jasmine"—*Gelsemium nitidum* (*Loganiaceæ*) (*G. sempervirens*, Aiton) (*Loganiaceæ*) imported from the United States, must be distinguished from the yellow jasmine cultivated here, which is a species of *Jasminum*.

Uses.—Has febrifuge properties, as it lowers the pulse and depresses the nervous system, being anti-spasmodic and analgesic. It has been much used in acute and rheumatic neuralgia, toothache, uterine and ovarian pain and chorea. It is a powerful paralyser, as well as tetanizer, and respiratory poison. Large doses contract the pupil and cause giddiness and diplopia.

F. Ellingwood advises preparations made from the *green* root collected in the early spring. Preparations from the dry root are, in his opinion, almost entirely inert. He utilised a 'strong' tincture (strength not stated) dose 5 to 15 minims, and in extreme cases 30 minims every hour or two. In poisonous doses it produces dilation of the pupils and paralysis of the muscles of accommodation. Exophthalmos and drooping of the eyelids are early symptoms of its paralysing action. Nervous irritation in all acute inflammations or acute fevers of childhood may be treated with this remedy. Indicated in adults in acute peritonitis, ovaritis, metritis, salpingitis, mastitis and puerperal fevers. In acute colds and in epidemic influenza. In dysmenorrhœa, neuralgia and migraine. An important heart remedy.—Pres.. Oct., 1913,275

The plant contains at least two alkaloids, one designated **Gelseminine** (crystalline), which is highly toxic, the other (Gelsemine), which is of little importance. Much confusion has arisen between these bodies.

Antidotes.—Emetics, Atropine or Strychnine hypodermically, repeated, and Nitroglycerin; or Amyl Nitrite; artificial respiration, stimulants.

P1 **Gelseminina.** $C_{22}H_{26}N_2O_3 = 366{\cdot}338$ (Alkaloid).

This base is called by some workers 'Gelsemine,' and the formula is that found by Spiegel for his 'Gelsemine.' We continue as for years past, to retain our nomenclature for this alkaloid to avoid confusion, *vide* further notes in *Vol. II.*

Dose.—$\frac{1}{100}$ to $\frac{1}{32}$ grain (**0·0006 to 0·002 Gm.**).

Yellowish-white minute crystals, M.pt. 160° C., with a bitterish taste, odourless, sparingly soluble in water, easily soluble in alcohol, ether, and dilute acids. This forms crystalline salts, and has mydriatic properties.

P1 **Gelseminінæ Hydrochloridum.**

$C_{22}H_{26}N_2O_3.\ HCl\ (?) = 402{\cdot}803$.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

In white, granular crystals, freely soluble in water.

Ⓟ **Ophthalmic gelatin discs** contain $\frac{1}{500}$ grain **Gelseminine.**

Ⓟ **Gelsemin; Extractum Gelsemii Pulvis.** *Dose.*—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) in a pill with spirit and glycerin.

The powdered alcoholic extractive (resinoid) of a pale brown colour. *Must be distinguished from the alkaloids. To be prescribed as Gelsemin 'Extractive.'*

Toxic symptoms following $\frac{1}{10}$ grain Gelseminine hydrochloride given instead of Gelsemin.—B.M.J. i./89,355.

Extractum Gelsemii U.S. IX., is prepared by alcoholic percolation so that 1=4 of drug, Magnesium Oxide and Starch being used as diluent.

Ⓟ**Fluidextractum Gelsemii, U.S. IX.,** By percolation with a mixture of Alcohol 4 and Water 1. Strength 1=1. *Average dose*—$\frac{1}{2}$ minim (**0·03 Cc.**).

Dysmenorrhœa is well treated by 3 minims of this fluid extract with 3 to 5 minims of Tincture of Belladonna thrice daily. Will often relieve pain in the most obstinate cases

For nervousness before examination a small dose thrice daily is a useful tonic. B.M.J. i./09,1380.

Ⓟ**Tinctura Gelsemii** (*Off.* and B.P. 1898).

Gelsemium in No. 40 powder 2, Alcohol (60%), *q.s.* to 20. Percolate. The tincture is fluorescent.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), often combined with bromide of ammonium or potassium for neuralgia.

Flavoring.—Syl Anethi, Syl Rosæ; Syrupus Aurantii.

For neuralgia of face and jaws associated with carious teeth—15 minims of the tincture every 6 hours rarely fails to give relief.

Disordered vision may follow even moderate doses.—B.M.J.i./01,

640. In the knowledge of the writers a case of neuralgia has been treated by ½ drachm doses thrice daily for two months.

In rheumatoid arthritis S. Ringer recommended this with Cimicifuga *q.v.*

GLUCOSUM.

Syn. DEXTROSE, GRAPE SUGAR. $C_6H_{12}O_6=180\cdot126$.

Liquid Glucose occurs as a viscous mass containing about 20% moisture. It is prepared by acting on Starch with Dilute Hydrochloric Acid. Further varieties are **Pure Dextrose** in white 'granular' powder, and **Solid Glucose** less pure in yellowish masses containing 10 to 20% of bodies allied to Dextrin, viz., Amylin and Gallisin.

GLUCOSE of commerce (Liquid) is of two kinds, '**Crystal**' and '**Neutral.**' 'Crystal' is the neutral variety bleached with Sulphites. It is 'water-white' and contains up to 7 grains Sulphur Dioxide per lb. The neutral is of pale yellow colour and is usually free from traces of Sulphur Dioxide. Its flavour is superior to the crystal variety. It has approximately a quarter the sweetness of refined sugar and it is not so good a preservative. Analyses of Crystal Glucose showed Dextrose 34 to 48%, Dextrin 30 to 45%, Sulphur Dioxide free and combined 0·03 to 0·1%, Moisture 14 to 20%.—H. H. Robins, C.D., Mar. 31/17.

If Cotton Wool is treated with Sulphuric Acid one vol. and water 3 vols. a viscous solution is produced which becomes later as fluid as water. From this Glucose is obtained.—C. T. Cross, C.D. i./17,252.

Glucose Tubes are prepared for artificial feeding as a preliminary to severe operations, for the resultant shock, and for wasting diseases. The use of this carbohydrate injection is, beyond doubt, of great value and ought to be more widely known and practised The glass tubes can be carried about for every serious operation. The contents of a tube are diluted to a pint with boiled water to make a 5% solution (which strength is isotonic with the blood) and as much as a litre of this solution may be injected, and has never been found to cause any evidence of sugar in the urine. An ordinary aspirator needle about 1 mm. in transverse section of its lumen, attached to 3 feet of rubber tubing with a suitable glass reservoir above are all the apparatus required; this is carefully sterilised by boiling and is filled with the sterilised injection. The needle is introduced under the skin of the arm near the axilla—the skin having been previously carefully cleansed—the douche is then raised 2 feet or so and the transfusion proceeds easily. The effect of the treatment is good as regards pulse, general strength and relief of thirst.—A. E. Barker, B.M.J. i./02,770.

By this means water, the first need of the system, can be given in large amount and with perfect safety and sugar to the extent of 2 ounces per diem—an important food without any demand upon the alimentary tract. Increased action of the kidneys by free instillation of fluids more useful furthermore in carrying off diluted toxic matters from the system.—A. E. Barker, L. ii./09,290; B.M.J. ii./09,266.

Gastric ulcer has been treated by giving nothing, not even water by the mouth, and supplying 3 or 4 pints daily of Saline Sugar Solution —the method gives the ulcer every chance of healing. Secondary parotitis may however occur, special care is therefore necessary to order antiseptic mouth washes.—B.M.J. i./09,1296

Delayed Chloroform Poisoning treated by rectal injection of Sodium Bicarbonate. Also Glucose Solution ½ ounce in ½ pint of Milk by nasal tube and a 10% solution by the rectum four-hourly, in addition to a good supply of Carbohydrate food. Improvement nothing short of marvellous, and recovery perfect.—L. ii./09.710.

Cyclic or recurrent vomiting. All food should be withheld from the stomach and rectal feeding substituted. Glucose should be added to the Normal Saline for rectal use not only as food, but because the adequate use of fat requires co-operation of active Carbohydrate metabolism.—P.R.S.M. Diseases of Children Sect., Feb. '10,85.

Subcutaneous injections of Glucose Solutions 2 to 5% or intravenous injection of strengths 5 to 7% are well tolerated by patients in a quantity of 1000 Cc. per diem. Sugar is excreted by the urine after repeated injections, but only to the extent of 2 to 3% of the quantity injected. The Glucose is to be dissolved in Normal Saline Solution, filtered and boiled. For intravenous injection from 4 to 8 drops of Adrenalin Solution 1 in 1000 must be added. The method should be valuable in treating various ailments in which feeding in the natural way is difficult, especially in the hyperemesis of hysteria and pregnancy, in diseases of the gastro-intestinal canal and in cholera. In these the grape sugar is more efficacious than injection of salt solution.—L. i./11,199.

Perforation of the stomach and duodenum. Glucose Injections subcutaneously or intravenously help to raise vascular tension lowered by sweating, vomiting and toxæmia, also aid dilution and elimination of the toxins by the kidneys,—moreover, leucocytosis is said to be increased by this and by 'Normal Saline' Injections.—A lecture on Drainage of the Abdomen under Various Conditions.—A. E. Barker, B.M.J. i./13,106.

Value of rectal feeding Absorption of Dextrose (5% solution in Saline Solution when so given is proved by the way it raises respiratory quotient and abolishes or diminishes acidosis; on the other hand protein absorption is either nil or exceedingly minute,—the salts in foods of this kind are absorbed and probably produce what good is done,—there is indeed no place in therapeutics for nutrient enemata containing protein and fat.—B.M.J. i./11,872.

Post-operative shock, prophylactic use of 1 to 2 litres, 5% of Solution per rectum or subcutaneously before and during operation.—B.M.J.,E ii./15,36.

In gastric ulcer the hyper-acidity of the stomach-contents hinders digestion of carbohydrates. Dextrose is assimilable and causes less secretion than starch. Contraindicated, however, in cases with atony as it favours fermentation. It is better than Cane Sugar. Lactose is even better, being least liable to undergo fermentation.—Pr.Nov.1908,680.

Glucose is said to be employed in the sophistication of honey, hence Oxymel Scillæ has varied in colour and density.—P.J.ii./03,778,871.

Bromidrosis, ozæna, otorrhœa treated by swabbing with 25% Glucose solution. Chronic vaginal discharge treated by 25% Glucose Pessaries in gelatin basis.—T. H. C. Benians, B.M.J. i./18,669.

Glucose as Surgical Dressing.—The wound is dusted with powdered glucose and covered with strips of protective silk, having been first cleaned with tampons soaked in hot boiled water. May be painful. In some cases antiseptics may be wanted before the glucose. The sugar acts as a nutrient to the tissues. Also used as **moist dressing**—L. i./13,651.

Ulcers dressed with 40% Glucose; also to replace the Liquid Paraffin in B.I.P.P.—B.M.J. ii./18,574.

The degree of lymph lavage produced by 5% Saline Solution was not great. A substance with greater osmotic power—*e.g.*, liquid glucose—found preferable (with 1 in 80 Carbolic Acid). Gun-shot wound.—H.B. Whitehouse, L. i./15, 850.

For Estimation of Glucose in Urine *see* Vol. II.

Dextrin (P. Helv.).—Yellowish powder or gum-like masses. Is obtained commercially by heating starch to 200° C. According to P.G.1. it is made by heating potato Starch 150, with Oxalic Acid 4 in water 750 with frequent stirring until a little of the mixture no longer gives blue with Iodine. Dextrin takes up some Iodine without colouring. It is necessary to first saturate the liquid with the Iodine and then add a slight excess to get the coloration. Neutralise with calcium carbonate and evaporate the filtered liquor. Consists principally (there are various other dextrins formed before this) of Achroodextrin which is the ultimate product of starch hydrolysis before the grape sugar stage is reached.

GLYCERINUM.

$C_3H_5(OH)_3=92{\cdot}079.$

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Manufactured by decomposing fats with alkali or superheated steam.—P.J. i./06,316. ***Soluble*** in alcohol and water in all proportions, but immiscible with Ether or Chloroform.

Uses.—Internally tends to relax the bowels. Is added to cough mixtures and to relieve forms of indigestion with gaseous distension. As an enema $\frac{1}{2}$ ounce alone or with $\frac{1}{3}$ water added relieves constipation, and it reduces piles. Externally 1 with 2 or 3 of water prevents cracks of chilblains and forms an ingredient in a large number of skin applications. It is a useful solvent for many active principles of drugs, standing midway between alcohol and water, *c.f.* **Glycetracta** It is also a valuable preservative, *c.f.* "Aqueous" Tinctures.

For burns stated to have been of much value as an application. Cotton wool to be soaked with it and covered with Oiled Silk.

As a throat pigment, and for uterine application, glycerin of tannic acid may be used double the official strength—1 in $2\frac{1}{2}$ of Glycerin—**Pigmentum Acidi Tannici,** the *Off.* Glycerinum Acidi Tannici being 1 in 5.

Glyceritum Acidi Tannici, U.S., is 1 in 5, **P. Belg.** Tannin 3, Glycerite of Starch 17.

Wounds have been treated by osmotic action by Glycerin in conjunction with ichthyol.—*See Wounds.*

Glycerinum Boracis (*Off.*) is not a mere solution; it has an acid reaction and when mixed with an alkaline carbonate evolves carbonic acid, *c.f.* Vol. II.; useful, in infantile diarrhœa, in doses of 20 minims, repeated according to age.

Glycerinum Aluminis (*Off.* and 1898) is a useful astringent in chronic pharyngitis; is less disagreeable than tannin.

Gargarisma Aluminis.

U.C.H. 2% in Acid Infusion of Roses; C.H.W. 5 grains with Tincture of Myrrh 40 minims to ounce.

Glycerin Jelly, for toilet use.

Gelatin 140 grains, Rose Water 6 ounces; soak a few minutes and heat in a water-bath to dissolve; add, when cool but still fluid, White of Egg ¾ ounce. Heat to coagulate completely, and add Glycerin 6 ounces, Salicylic Acid 12 grains. Mix well, filter through a hot-water funnel, and bottle while warm

Lubricant Glycerin Jelly is supplied in '**Collapsubes.**' Is somewhat softer than the above; is also suitable for toilet use intended for the lubrication of Stomach Tubes.

Glycerinum Aluminis et Acidi Tannici.

Potassium Alum (free from iron), in powder, 1, Glycerin 6. Heat to dissolve, and add Tannic Acid 1.

This forms a solution which is a very astringent throat pigment; has the advantages of a gargle without destroying the appetite. An ounce to a pint of tepid water forms a useful astringent vaginal injection.

Glycerinum cum Aqua Rosæ.

Glycerin 2, Rose Water 3 (prepared with Otto of Rose). Mix. An agreeable emollient for the skin.

Ⓟ **Glycerinum Hydrargyri Perchloridi** contains ⅔ grain in 1 minim, *q.v.*

Glycero-alcohol. *Syn.* PETIT'S LIQUOR.

Dose.—5 to 60 minims (**0·3 to 4 Cc**).

Glycerin 333, Distilled Water 146, Alcohol 95% 580. Is used as a solvent of alkaloids and active principles, as it keeps indefinitely and does not evaporate. It has Sp. Gr. about 1.

Glyco-gelatin, T.H.

Refined Gelatin 1 ounce, Glycerin (by weight) 2½ ounces, Solution of Carmine *q.s.*, Orange Flower Water 2½ ounces. Soak the gelatin in the water two hours, then heat in a water-bath till dissolved, add the glycerin, and stir well together. When nearly cold add the carmine solution; mix till uniformly coloured.

Gelatinum Glycerinatum, U.S. Soak Gelatin 1 for one hour in sufficient previously boiled and cooled water to cover it. Drain and add Glycerin 1, heat until dissolved, strain hot, and evaporate to 2 by weight.

Glyco-gelatin affords a ready method of prescribing pastils to meet the requirements of individual cases; one ounce of the mass will make twenty-four pastils; it is medicated by melting in a water-bath, and the medicament added; or this, if insoluble, is first rubbed with a little glycerin, and then mixed with the hot basis, and cooled by pouring into an oiled tray, and, when solidified, cut into the required number of pastils. Pastils are specially suited to cases of inflammation of the tongue or palate, and their gelatinous nature gives much relief in dryness of the throat. The following list may be kept prepared :—

	Pastillus	
	Acidi Borici	gr. 2
	Acidi Carbolici	gr. $\frac{1}{2}$
	Acidi Citrici Ol. Limonis	gr. $\frac{1}{2}$ m. $\frac{1}{4}$
	Ammonii Bromidi	gr. 1
Ⓟ	Apomorphinæ Codeinæ	gr. $\frac{1}{32}$ gr. $\frac{1}{10}$
	Bismuthi Carb.	gr. 3
Ⓟ	Bismuthi Carb., T.H. Morphinæ Acet.	gr. 3 gr. $\frac{1}{40}$
	Cascara Sagrada	gr. $2\frac{1}{2}$
Ⓟ	Cocæ Extracti	gr. $2\frac{1}{2}$
Ⓟ	Cocainæ HCl. gr. $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{20}$ (T.H. has $\frac{1}{10}$.)	
Ⓟ	Cocainæ Morphinæ	gr. $\frac{1}{15}$ gr. $\frac{1}{30}$
Ⓟ	Codeinæ	gr. $\frac{1}{8}$
	Convallariæ Tinct	m. 2
	Eucalypti Olei	m. $\frac{1}{2}$

	Pastillus	
Ⓟ	Eucalypti Olei Cocainæ HCl.	m. $\frac{1}{2}$ gr. $\frac{1}{20}$
Ⓟ	Heroin	gr. $\frac{1}{24}$
	Menthol, T.H. (St. Th. H. gr. $\frac{1}{4}$)	gr. $\frac{1}{6}$
Ⓟ	Menthol Cocainæ HCl.	gr. $\frac{1}{20}$ gr. $\frac{1}{20}$
Ⓟ	Menthol Codeinæ	gr. $\frac{1}{20}$ gr. $\frac{1}{10}$
	Menth l Eucalypti Olei	gr. $\frac{1}{20}$ m. $\frac{1}{2}$
Ⓟ	Morphinæ Acet.	gr. $\frac{1}{30}$
Ⓟ	Pini Pumil. Olei Terpeni Hydratis Heroin HCl.	m. $\frac{1}{2}$ gr. $\frac{1}{8}$ gr. $\frac{1}{48}$
	Sulphur Præcip Potassii Tart. Acid.	gr. 5 gr. 1
	Terebeni	m. 2
	Thymol	gr. $\frac{1}{32}$
Ⓟ	Tussis=Cocainæ et Morphinæ	gr. $\frac{1}{15}$ gr. $\frac{1}{30}$

The **Pastils** or **Jujubes** commonly sold of oval or round shape (frequently 'sugared') will be found in the index under Trochisci marked '**G.**' (*i.e.*, of Gum).

Marshmallow Pastils, PASTILLES DE GUIMAUVE.

Boil incised Marsh Mallow Root 100 in Water 400, strain off the liquor. Evaporate to about 80 and mix with Tragacanth 10 and Sugar 1,000, adding Orange Flower Water 10 or more if necessary to make a mass for cutting into Pastils weighing 20 grains (1·2 Gm.). This basis may be medicated with throat remedies similar to those given under Glyco-gelatin Pastils.

Suppositoria Glycerini (*Off.*). Gelatin 14, Glycerin by weight 70, Water *q.s.* to 100, suitably combined. Pour into moulds of 15, 30, 60, or 120 minims or other capacities as required. Contain 70% by weight of Glycerin. This basis may be used for gelatin **pessaries.**

U.S. orders Glycerin 30, Monohydrated Sodium Carbonate 0·5, Stearic Acid 2, Water 5, in Gm. for 10.

Vaginal Suppositories, U.S., are globular or oviform in shape and weigh about 10 Gm. if made with Glycerinated Gelatin, and 4 Gm. if with Theobroma Oil, *v.* also **Ovules.**

Glycerin Tampons consist of gauze and wool swabs soaked in Glycerin medicated with Ichthyol 5 and 10%, also Resorcin 1 and 2%.

Hollow Suppositories, composed of Oil of Theobroma. May be filled with 20, 45, or 90 grains of Glycerin ; they are prompt in action.

Hollow Suppositories and **Pessaries** may also be filled with **Bismuth and Cocaine Ointment, Gall** and **Opium Ointment, Liquid Extract** of **Hamamelis, Hamamelis Ointment, Suprarenal Extract, Adrenalin Solution.**

Cataplasma Kaolini, U.S. VIII. (Not included in U.S. IX.)—

Kaolin 577, Boric Acid 45, Thymol 0·5, Methyl Salicylate 2, Peppermint Oil 0·5, Glycerin 375 (all by weight). Heat the Kaolin one hour on a water bath, add boric acid, glycerin, etc.

Cataplasma Salicylicum Compositum, ✱ **Antiphlogistine,** (T.M. 253831). **Antithermoline,** ✱ **Sorbefacin,** (T. M. 303921), and **Thermofuge** are useful to remove œdema, to relieve pain and swelling of local inflammations.

Glycerin Substitutes.

During the war we had frequent occasion to make the following which we devised.

No. 1.—*For external use* (for viscous effect).

Tragacanth 225 grains, alcohol 90% 2 ounces, Lavender Oil 30 minims, water to 2½ pints, *misce s.a.*

No. 2.—*For internal use* (sweetening and demulcent effect).

Mix Liquid Glucose 1 part with 3 parts of the above.

No. 1 Formula.—***Caution*** must be exercised in the use of aqueous preparations of this kind, *e.g.* in the case of an emergency formula for **Glycerin of Carbolic Acid.** The absorption is far greater and the strength should be reduced to 5% or even 2½% for use as a throat paint. *Physicians should specify strength required.*

Irish Moss (washed) ½ ounce, water 24 ounces. Bring to the boil and keep boiling 15 minutes. Strain and make up to 19 ounces and add Glucose 1 ounce. Strain again without pressure until clear.—J. Lennox, P.J. i./17,186.

Turkey Red Oil (*q.v.*) has also been used.

GLYCETRACTA (GLYCETRACTS).

Strength.—1 = 1 of Drug.

Dose.—The equivalent in volume to the dose of the drug, excepting those standardised. *v.* p. 432. For complete list of doses see Index.

Glycerin is well known to be a good all-round solvent and preservative for medicinal substances. As Marshall remarks, "Substances which are soluble in water and insoluble in alcohol are to some extent soluble in glycerin." It should be noted that, as a general rule, glycerin extracts must contain at least 25% of glycerin to preserve them.

"Glycetracts" in general, first described by us, C.D. i./08,489, have the advantage of miscibility and compatibility with aqueous vehicles, with exceptions (those of alkaloidal drugs made with a necessary small addition of acid would be incompatible with alkalis). Many of them are suitable both for internal and local use; they keep well, are cheap, and being free from alcohol, are convenient and suitable for export.

The following glycetracts are perfectly miscible with water forming a clear solution:—

P1 Glycetract of belladonna.
Glycetract of calumba.
Glycetract of cascara.
Glycetract of chiretta.
Ⓟ Glycetract of conium.
Ⓟ Glycetract of digitalis.
Ⓟ Glycetract of gelsemium
Glycetract of gentian
Glycetract of hamamelis
Ⓟ Glycetract of hyoscyamus.
Ⓟ Glycetract of jaborandi (almost).
Glycetract of quassia.
Glycetract of sarsaparilla.
Glycetract of squill.
Glycetract of senega.
Glycetract of senna.
Glycetract of taraxacum.
Glycetract of valerian.

The following do not form perfectly clear solutions with water, but can be rendered miscible, as stated later :—

P1 Glycetract of aconite.
Glycetract of catechu.
Glycetract of cinchona.
Ⓟ Glycetract of coca.
Ⓟ Glycetract of colchicum.
P1 Glycetract of ergot.
Ⓟ Glycetract of hydrastis.
Glycetract of krameria.
Glycetract of rhubarb.
Ⓟ Glycetract of Virginian prune.

METHOD OF PREPARATION.

1. For Drugs containing water - soluble constituents, bitters, tannin principles, and some flavouring agents :—

(*a*) *Percolation-process.*—For those drugs which will percolate satisfactorily without "blocking" this method is to be preferred. Macerate 100 of the drug in No. 20 powder in glycerin 50 and water 200 for twenty-four hours, then commence percolation. Reserve the first 50 of percolate and continue percolation with chloroform-water (1 in 1,000) until exhausted. Evaporate the liquor to 50 and add to the reserved portion.

Experiments show that this percolation method is suitable for calumba, cascara (1% of strong solution of ammonia to be added), digitalis, gentian, hamamelis leaves, krameria, rhubarb, sarsaparilla, senega, taraxacum, valerian and Virginian prune bark. Glycetract of Virginian prune is made without heat.

(*b*) *Maceration-process*—*i.e.*, for drugs which will not percolate satisfactorily. Macerate crushed drug 100 in a hot mixture of glycerin 50 and water 200 for six hours, press off, and repeat maceration with hot water twice. Combine liquors and evaporate to 100.

Experiments show that this is suitable for chiretta, liquorice (cold maceration), quassia, senna (cold maceration), squills (cold maceration).

Glycetract Digitalis (1 = 1).

Dose.—1 to 2 minims (0·06 **to 0·12 Cc.**) We have recently improved the method of making this Glycetract as follows :—Wash the powdered leaves 100 thoroughly with Petroleum Ether and dry, then make an extract, strength 1 in 1, from this washed leaf using Glycerin 20 and Absolute Alcohol *q.s.*, to 100. Reserve the first 75 and percolate to exhaustion with Absolute Alcohol, add the extractive to the reserve and make up to 100 by volume with the Alcohol. This method improves the Digitoxin content of the preparation and retains also the other constituents. This preparation is fully eight times as active as a strong Digitalis Tincture.

2. Alkaloidal Drugs.

For drugs containing alkaloids we recommend to percolate, wherever possible, crushed drug 100, with a mixture of glycerin 50, acetic acid 9, and water 191, and proceed otherwise as under 1 (*a*), making the final product 100 containing about 3 per cent. of acetic acid.

This method our experiments show to be applicable for aconite, belladonna, cinchona, colchicum, conium, ergot, gelsemium, hydrastis hyoscyamus, ipecacuanha and jaborandi. A larger proportion of acid does not yield larger alkaloidal contents.

The acetic glycerin mixture extracts the bulk of the alkaloids in most cases. The marcs left over, after being pressed dry, were percolated with alcohol and found to be, practically speaking, exhausted, with one or two exceptions. Hydrochloric acid might yield better figures, but there are some objections to its use. (Beringer uses Tartaric Acid—2% in the finished product except for Colchicum, Conium and Ipecacuanha in which Acetic Acid is used.)

"Glycetracts" of those drugs which do not form *clear liquids* with water can, if preferred perfectly miscible, be replaced by an aqueous extractive, evaporating and mixing a sufficiency of glycerin with the warm liquor. Alkaloidal drugs should, however, be handled by the method given under No. 2, and the fact of these forming opalescent mixtures with water cannot well be obviated.

The following **Glycetracta** are standardised :—

Glycetract.	Alkaloidal Strength.	Dose.
P1 Aconite	0·4 % Alkaloids.	(Average) 1 min.
P1 Belladonna	0·375 ,,	1 to 2 min.
Cinchona	3·0 ,,	8 to 25 min.
Ⓟ Coca	0·25 ,,	1 to 2 dr.
Ⓟ Colchicum (seeds) ..	0·5 ,,	(Average) 3 min.
Ⓟ Conium (seeds)	0·45 ,,	(Average) 3 min.
Ⓟ Digitalis	M.L.D.0·1Cc.per 100 Gm. frog.	1 to 2 minims.
Ⓟ Hyoscyamus	0·075% Alkaloids.	(Average) 3 min.
Ⓟ Ipecacuanha	1·1 ,,	Expectorant 1 to 4 min Emetic 30 to 40 min.
P1 *Nux vomica	0·75% Strychnine.	2 to 6 min.

For **Sanguinaria,** Acetic Acid is unsatisfactory, 10% of Hydrochloric Acid is, however, useful.

Fluidglycerate of Buchu is made with Buchu 100 Gm., Potash Solution 50 Cc., Glycerin 50 Cc., Water 100 Cc.

Fluidglycerate of Grindelia is also made alkaline on the lines of that of Buchu. Should prove effective as a topical application in rhus poisoning.—Am. Jl. Ph. Oct./09. p 475.

Glycetracta—*Lancet* note on.—L. ii./09,62. See also Beringer who has worked on similar lines.—Am. Jl. Ph. 1907,410 ; 1908,525 ; 1909,312.

Glycopasta is the name given to a Glycetract (*neutralised if necessary*), made into a paste for local use by mixing with Tragacanth 2 to 3%, *e.g.*, the following :—

P1 **Glycopasta Belladonnæ** 0·375% Alkaloids. (Glycerinum Belladonnæ *q.v.* is about 0·5% Alkaloids.) P1 **Glycopasta Aconiti** is the Glycetract alone (no thickening necessary). Ⓟ **Glycopasta Hyoscyami** 0·075% Alkaloids. If considered too strong they should be directed to be diluted with Glycerin.

GLYCYRRHIZA.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) or more.

The peeled root and subterranean stem of *Glycyrrhiza glabra* (*Leguminosæ*)—*Off.* U.S. has *G. glabra typica* (Spanish) and *G. glabra Glandulifera* (Russian).

Aqueous extraction usually yields 24 to 38% **Solid Extract.** *Dose.*—5 to 60 grains (**0·3 to 4 Gm**).

This Glycetract is best made with Hydrochlic Acid—the strength employed is 5 Cc. of Hydrochloric Acid Sp. gr. 1·16, to 100 Gm. of drug.

Extractum Glycyrrhizæ Purum. U.S.

Exhaust Glycyrrhiza in No. 20 powder with diluted ammonia and evaporate to pill consistence.

Extractum Glycyrrhizæ Liquidum (*Off.*).

By cold exhaustion 1 = 1, contains ⅕ of its volume of 90% alcohol. Now made with Chloroform Water—a necessary improvement *Dose.*—½ to 1 drachm (**2 to 4 Cc.**). Incompatible with acids.

Elixir Pectorale.—*Syn.* **Liquor Pectoralis. P. Dan.** '93. King of Denmark's Chest Mixture.

Dose.—1 drachm (**4 Cc.**). Extract of Liquorice 1, Fennel Water 3, Anisated Liquid Ammonia 1.

(**Liquor Ammonii Anisatus.**—*Syn.* **Esprit Ammoniacale Anisé** consists of Oil of Anise 1, Alcohol 25, Solution of Ammonia 5. Several of the Foreign Pharmacopœias give similar formulæ, *e.g.*, that of P. Dan. 1908.)

Glycyrrhizinum Ammoniatum, U.S.

Dose.—½ to 5 grains (**0·03 to 0·3 Gm.**).

Glycyrrhizin is contained in the root as the Ammonium Salt.—Kraemer.

Readily soluble garnet coloured, shining scales. It possesses a persistent sweet taste. The acid (*v. infra*) precipitated from it is bitter-sweet and has acid reaction. A grain will flavour 6 ounces of water. It may, perhaps, be considered as the Ammonium Salt of Glycyrrhizinic Acid which, according to Tschirch, has the formula $C_{41}H_{61}O_3(COOH)_3$. *For further details on this and the Assay of Liquorice vide Vol. II.*

Manufacture.—*Extemporaneous Process.*—To make a small quantity dilute ½ ounce of Liquid Extract with water to 2 ounces, add dilute Hydrochloric Acid until a precipitate ceases to fall: collect, wash free from chlorides, dissolve in dilute Ammonia, *q.s.*, add water to about 1 ounce, filter, evaporate to a thick syrup, and spread on a pill tile or piece of glass, dry and scale. Yield about 20 grains.—B. & C.D., June 27/13, p. 630.

Liquorice preparations cover the taste of ammonium chloride, alkaline iodides, cascara, magnesium sulphate, quinine sulphate, ipecacuanha, and aloes, hence is in Mistura Sennæ Composita, Decoctum Aloes Compositum and Confectio Sennæ. As a demulcent it was used in Infusum Lini, B.P. 1885. N.B.—*Incompatible with Acids.*

In addition to the extracts, dried 'Liquorice Juice,' or 'Spanish Liquorice,' is sold, that bearing the stamp of Solazzi being most prized. Pontefract Cakes of Liquorice and 'Pipe Liquorice,' are useful in allaying tickling coughs.

Tabellæ Glycyrrhizæ, Liquorice-Chocolate Tablets.

Liquorice in chocolate basis. Useful for coughs and colds.

Trochisci Glycyrrhizæ, Brompton Hospital, and City Road Chest Hospital, commonly known as 'Brompton' Cough Lozenges, or 'Brompton Blacks.'

Liquorice Extract 3 grains, Anise Oil ½ minim in each (Acacia basis).

Pastilles de Réglisse.—Liquorice pastils, much used in France.

Pulvis Glycyrrhizæ Compositus (*Off.*).

Syn. Pulvis Pectoralis (*Kurellæ*).

Senna and Liquorice of each 2, Fennel 1, Sublimed Sulphur 1, White Sugar 6½. Mix.

Dose.—1 to 2 drachms (**4 to 8 Gm.**), mixed with water or milk, taken early in the morning, is a mild and agreeable laxative. For constipation and hepatic disease, it is pleasant to take, and effectual without catharsis. U.S uses oil of fennel, which makes it less granular.

It is also prepared **sine Saccharo** (Hewlett),—with *half* above dose, more palatable, and more suited for use where sugar is barred.

Species Pectorales, P.G.V.

Coarsely cut Marshmallow Root 8, Liquorice Root 3, Orris Root 1, Tussilago Farfara (Coltsfoot) Leaves 4, Verbascum Flowers 2, Anise 2.

*GLYL AND *SYL FLAVORING AGENTS (*Martindale*).

The Official flavoring *Waters*, *Infusions*, *Spirits*, *Syrups*, and *Tinctures* are largely used, but in these there is room for improvements in many particulars.

Our suggestion is to employ as flavoring agents to prescribed mixtures' Solutions in either Glycerin or Syrup of those Essential Oils which are pleasant to the taste. These preparations are called respectively ***Glyl** and ***Syl*** throughout our pages.

'Glyl' and 'Syl' Flavoring Agents will keep good for a considerable length of time within ordinary limits of temperature. Their use will tend to uniformity, and they show distinct advantage in time saving, both in prescribing and in dispensing

The preparation of the Distilled Waters hitherto employed entails unnecessary labour, more especially as several, *e.g.* Cinnamon, Orange Flower, Rose, have poor keeping qualities. Then again, many of the Aromatic Waters require the addition of either Glycerin or Syrup to render them of use in covering the taste of nauseous medicines. The same applies to Tinctures and Spirits.

Fresh infusions of drugs are useful for flavoring, but the fact seems to be ignored that, though the infusions are '*fresh*,' the drugs in many instances are *dried*, and *ergo* may have lost much of their aroma.

Of the usual flavoring tinctures in our opinion that of Orange is the only one of sufficient power to 'cover' the taste of a nauseous drug, but alone it is of little avail—a sweetening agent in addition is essential. Syrup of Orange by reason of its utility has become hackneyed.

We dealt more fully with the raison d'être of **Glyl** *and* **Syl** *flavorings in the 15th Edition. They have now been well tried and are much prescribed.*

Preparation.—

Glyl and Syl flavorings are all of uniform strength—1 of the Essential Oil in 500 respectively of Glycerin or Syrup—or approximately 1 minim to the ounce, and are quickly prepared by placing half the required amount of Glycerin (slightly warmed, *e.g.*, by standing the bottle in a little hot water) or Syrup in a bottle capable of holding the full amount, adding the required amount of Essential Oil mixed with three times its volume of 90% Alcohol in small portions with continuous shaking, then adding the remainder of the Glycerin or Syrup with further vigorous shaking.

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*These two words are Registered Trade Marks—the property of the authors. We permit *Pharmacists to make the preparations in question for the flavoring of prescribed medicines* The strength and method of preparation to be strictly adhered to as described herein.

In all other respects the use of the Trade Marks is reserved by the owners Trade Marks in other portions of the book must be carefully observed.

Thus made (it is intended the pharmacist should prepare a stock ready for use) and allowed to stand a short time for the small excess of Essential Oil to rise (the excess is easily removed by passing through a pledget of moist Cotton Wool or by the use of a separating funnel), it will be found that all the following are perfectly clear, and remain so for a long period, with exception perhaps of Syl Anisi (Glyl Anisi is clear), Syl and Glyl Sassafras, and Syl Pimentæ. Indeed the solubility of these Oils in Glycerin is remarkable.

Glyl vel **Syl** Amygdalæ Amaræ *sine* HCN.
,, ,, Anethi.
,, ,, Anisi.
,, ,, Aurantii Amari.
,, ,, Aurantii Floris.
,, ,, Carui.
,, ,, Caryophylli.
,, ,, Cinnamomi.
,, ,, Fœniculi.
,, ,, Lavandulæ.
Glyl vel **Syl** Limonis.
,, ,, Menthæ Piperitæ.
,, ,, ,, Viridis.
,, ,, Myristicæ.
,, ,, Pimentæ.
,, ,, Pini Pumilionis.
,, ,, Rosæ.
,, ,, Sassafras.
,, ,, Thymi.
,, ,, Vanillæ (1 of Essence *q.v.* in 8).

Note.—We find by experiment that several of the Glyl Flavorings *can* be made stronger if desired. Glyl Cinnamomi, Glyl Lavandulæ and Glyl Pini may be prepared 1%. Glyl Pini and Glyl Rosæ can be made 3 minims to the ounce to form a solution, *but these are not intended for use except when so prescribed*—as a general rule the strength 1 in 500 will suffice. The oils in the case of Syl Anisi, Aurantii Amari, Cinnamomi, and Thymi are not held in solution sufficiently to enable these *to be kept for any length of time*—the Glyls of these, however, retain full flavour.

The favorites in the entire series according to our taste were :—

Glyl vel **Syl** Amygdalæ Amaræ.
,, ,, Coriandri
,, ,, Lavandulæ
,, ,, Menthæ Piperitæ
,, ,, Rosæ.
,, ,, Vanillæ.
Glyl Aurantii Amari.
,, Cinnamomi.
,, Pini (excellent for Terebinthinous drugs).
,, Thymi.

Combined Glyl Pini and Syl Lavandulæ are useful for exceedingly objectionable drugs.

Dose.—Of either Glyl or Syl, to flavor an ounce dose of a mixture 1 to 2 drachms, as a general rule suffices. In the case of Glyl or Syl Menthæ Piperitæ ½ drachm will be ample.

For nauseous drugs with a disagreeable penetrating *after taste* Glyls are frequently to be preferred. In certain affections where sugar in any form is to be avoided preference will naturally be given to the Glyls.

In the various instances in which Glyl or Syl flavorings are recommended in our pages, we have had regard to compatibility and custom heretofore, and have frequently selected an official or existing semi-official flavoring agent in addition so as to be of general assistance.

Occasionally a fresh infusion of a drug, *e.g.*, a vegetable bitter is required. In such cases the addition of a Glyl or Syl, if used in bold dose, will act both as preservative and flavoring agent,—both Essential Oils and Glycerin are antiseptics.

E. O. Rowland has suggested Glycerins of Lemon and Orange Peel made from fresh peel.—C.D i./14.504

GOSSYPIUM.—*Syn.* Cotton Wool.

The hairs of the seeds of *Gossypium Barbadense* and of other species of gossypium freed from fatty matter, employed as a wound dressing.

Manufacture of Cotton.—The bleaching solution may be made by dissolving 5 cwt. of 35% Chlorinated Lime in 600 gallons of water and allowing it to settle. One gallon of this solution with twenty gallons of water is considered strong enough for use. The bleaching solution is allowed to act for several hours. After removing the bleach liquor the cotton is soured and washed to get rid of lime and chlorine. The acids used for souring may be either sulphuric or hydrochloric. For washing, the softest water is used. After washing the cotton is soaped and again washed and the cotton finally treated with a little Tartaric Acid. This imparts crispness—a characteristic in demand but of no real value. For details of machinery required see A. W. Gerrard, P.J. i./16,573.

Cotton Wool is soluble in an ammoniacal solution of copper oxide.

The following surgical forms of **Cotton Wool (and Allied Dressings)** are in use. *See also* under the individual antiseptics for medicated preparations.

Bandages.

Black Cloth, 6 yards, 1½, 2, 2½, and 3 inches are prepared for use as slings.
Buttercloth, 1, 1½, 2, 2½, 3, 4, and 6 inches (6 yards).
Calico, 1, 2, 2½, 3, 4, and 6 inches (6 yards).
"Cataract" (of special form for bandaging after operation for)
Crepe, Geneva, 1½, 2, 2½, and 3 inches wide and 8 inch binders
,, Velpeau, 2, 2½, and 3½ inches wide.
Crinoline, for silicating and Plaster of Paris, 1, 2, 3 and 4 inches wide.
Domette, 2, 2½, 3, 4, 5, and 6 inches wide.
Elastic Circular Stocking, 2½, 3, and 4 inches (any length).
Elastic, India Rubber Webbing, 1, 2, and 3 inches wide.
Flannel, 2½, 3, 4 and 5 inches wide.
Gauze, Plain, Absorbent, 4 inches wide.
"Ideal" (a special elastic bandage) 2½ and 3 inches wide.
Muslin, Check, for Plaster of Paris, 2, 3, and 6 inches wide.
Open Wove, white absorbent, 1, 1½, 2, 2½, 3, 4, 5, and 6 inches wide
Plaster of Paris, 2, 2½, and 3 inches wide. In air-tight containers
Selvedge, white and grey, 2, 2½, 3, and 3½ inches wide.
Stockinette.—See Elastic Circular Stocking above
Triangular Splint.

Battist, Milne's. A substitute for oiled silk, guttapercha tissue, and jaconet: Can be boiled, and is spirit and greaseproof.

Billroth's Cambric—Consists of cotton fabric treated by a special process. It takes the place of Gutta Percha Tissue and Oiled Silk, being capable of sterilisation.

Buttercloth.—As a dressing for applying ointments, liniments, &c. Width 36 inches.

Cellulose Film in three varieties.—

'Taffetas.'—A yellow film similar in texture to Yellow Oiled Silk and suggested as a substitute for same. It is perfectly *greaseproof* but swells slightly in contact with moisture, hence though suitable for use with Soft Paraffin basis ointments is not intended for applying dressings containing aqueous medicaments. It is nevertheless sterilisable by moist heat.

'Aseptafilm.'—This modification is colourless and being transparent and sterilisable may be applied direct to wounds.

'Cellafine.'—This variety is the thinnest and is used as a greaseproof covering for packing pharmaceutical and food products to preserve same for export to hot climates.

All the above are unaffected by Alcohol and Ether, but they expand in contact with moisture—contracting again on cooling—in some cases this property is of distinct value

Cellulose Wadding.—A cheap absorbent dressing. Is prepared from wood fibre. **Cellulose Wadding** is in sheet form.

Eye Pads are ready cut, round or oval, consisting of a layer of wool between two sheets of gauze.

Felt, thick, coated with adhesive solution, in sheets 28 inches by 18 inches and with soap plaster for bed sores.

Gauze Tissue, see Gauze and Wool Tissue.

Gauze, White Absorbent, is prepared in 6 yard pieces. Tela Depurata, P.G. is similar.

The meshes of gauzes should be small and regular.—*cf.* Iodoform gauze.—G. Lenthal Cheatle, L i./13,1763.

Gauze and Wool Tissue, plain and medicated with Boric Acid, Carbolic Acid, Iodoform, Ⓟ Mercuric Iodide, [P1] Mercuro-Zinc Cyanide, Thymol, Picric Acid, are prepared.

Gauzes, Ribbon, as suggested by C. Stonham, have a woven edge and are used for plugging cavities and wounds.

The following are made in ¼ inch, ½ inch, 1 inch, 2 inch widths, in 12 yard lengths :—

Alembroth, Aluminium Acetate (useful for foul wounds.—L. i./03,936), Boric Acid, Carbolic Acid, Chinosol, Creolin, Iodoform, [P1] Mercuro-Zinc Cyanide, Ⓟ Mercuric Perchloride, also Non-Medicated.

Gauze Tampons, 3 inches long and ¾ to 1 inch in diameter (with thread attached), coated with soft soap, useful in obstinate constipation. Evacuation occurs in ¼ hour.—Pres., Feb., 1907.

Handkerchiefs, Aseptic (Silky Fibre), are medicated with Eucalyptus and Pine Oil, and Non-Medicated in wallets.—Intended for phthisical sufferers.

Impermeable Piline.—⅓ the thickness of spongio-piline of felt, and instead of the waterproof indiarubber backing of the latter, there is an antiseptic material, not affected by heat or strong spirit. Suitable for applying liniments in rheumatism, and where warmth is desired simultaneously.

Jute, in 1 lb. rolls for rough absorbent purposes.

Kapok Wool strongly advised as wound dressing. Useful absorbent of discharges.—B.M.J. i./18, 276.

Lambs' Wool. Antiseptic for tampons. As a treatment for prolapse of the uterus ; applied every day by the patient. Does not absorb fluids and maintains size and gives support. May be impregnated with mercuric biniodide 1 in 10,000.

Pure Animal Wool. *Syn.* THERMO-LAINE has many advantages over Cotton Wool, *e.g.*, in the use of a gamgee jacket. Cotton prevents the escape of moisture. In prolonged operative work the long anæsthesia lowers bodily temperature, it is important to take every precaution to conserve the heat of the mutilated patient. When the lowering effects of the anæsthetic and the operation cause cold clammy perspiration to exude, gamgee tissue retains it and becomes of the nature of a refrigerator ; here a wrap of sheep's wool would be preferable. Other uses, *e.g.*, rheumatism, pulmonary affections suggest themselves.—B.M.J ii./09,1673

Lint (*vide also* Steriloid Dressings), absorbent, is made both non-medicated and medicated :—Boric, 50% coloured pink. Iodoform, 10%. Non-Absorbent useful for local use.—M.P.C. ii./03,395. Styptic (10% Ferric Perchloride).

Muslin, Nainsook, width 36 inches. Somewhat softer than buttercloth. Is useful for ointments.

✱**Pontampons** (T.M. 307382) consist of a semi-solid slowly soluble medicated cone with a non-absorbent wool tampon attached—the whole encased in a gelatin shell. On introduction into the vagina the gelatin shell disintegrates ; the compressed wool tampon expands, carrying the medicated cone upward against the cervix, where it slowly dissolves, thus affording a continuous application to the inflamed and congested mucous membrane of the vaginal tract.

By mechanical expansion not only are the vaginal folds distended, thus assuring complete medication, but the Tampon raises and supports the uterus, thus relieving the venous congestion, thereby correcting displacements.

For the treatment of gonorrhœa, endometritis, cervicitis, vaginitis, eucorrhœa, dysmenorrhœa, prolapsus uteri.

The following Medications are made:—

(A) Ⓟ Ichthyol Compound—*i.e*, Ichthyol 2·5%, Iodine 0·14%, Carbolic Acid 0·5%, Powdered Hydrastis 1%.

(B). Ichthyol 10%.

(C). Protargol and Ichthyol, each 2%

(D). Ⓟ Opium and Hyoscyamus of each 2 grains, Belladonna 1 grain All the above are made with a Boroglyceride basis.

Sanitary Towels, Hygienic, for menstruation, of Sphagnum (*q.v.*) are absorptive, deodorant and antiputrescent. Southall's, Nos. 0, 1, 2, 3, 4 and extra large, and the "Mene" are of cotton fabric. Maw's are in two brands, 'ordinary' and 'superfine.'

Sponges, Carbolised, are used in abdominal surgery, they have fallen into disuse but some surgeons still prefer them to cotton swabs.—
(1) About 2 to 3 inches in diameter.
(2) About the size of palm of hand.
(3) Large flat, about 8 inches in diameter.

Sir W. Watson Cheyne says it is not necessary to discard these useful articles because they are spoilt by boiling. If immersed in suitable solutions for correct time (*e.g.*, 1 in 20 Carbolic for 1 week), they will be thoroughly sterilised. Much more suitable than gauze swabs for soaking up blood.—L. ii./97,1800.

Marine Sponges, Catgut and many useful materials have been abandoned on account of the supposed difficulties in disinfecting them—the idea being that nothing but heat is a trustworthy disinfecting agent. The operating theatre and arrangements are apt to assume undue importance. There is a great deal more in the treatment of wounds than simple cleanliness and the avoidance of irritation.—L. i./10,15.

Sponge Eduction.—In the treatment of cases of laceration of the finger in which a bare and protruding bone or extensive stripping of the skin with denudation of the deeper parts may render amputation necessary. The method makes it possible in most cases to save the full length of the stump. Flat Turkey Sponge is used, soaked in 1 in 40 Carbolic Solution before the operation. For details of methods *vide* L. ii./11,1348

Circular Gauze and **Wool** pads, about 3 inches in diameter. Also sterilised (*vide* Steriloid Dressings).

Spongio-Piline.—Thick felt with waterproof india-rubber backing for applying warm moist dressings.

Tillman's Dressing is Cellulose Wadding *q.v.*

Tow, Flax, *c.f.* **Tenax.**

Wool, Absorbent Cotton (also non-absorbent).
Both the above also in thin sheets measuring 20 by 14 inches.

✱ "Steriloid" Dressings. (T.M. 260647).

These dressings have been submitted to a temperature of 250° F. for 30 minutes at a pressure of 15 lbs. in an autoclave. Each parcel of dressing is wrapped by a patent method in wool, parchment wrapper, and enclosed in an air-tight dust-proof carton or hermetically sealed tin.

Bandages (in tins), 2, 2½, 3, and 4 inch.

Gauze, plain, absorbent, 1, 2, 6, and 12 yard cartons.
,, **Alembroth** and **Boric,** each 1 and 2 yards.
[P1] ,, **Cyanide,** 1, 2, 6, and 12 yard cartons
Ⓟ ,, **Biniodide,** 6 yards.

Lint, plain, absorbent, **Alembroth, Boric,** and [P1] **Cyanide,** each in cartons.

Wool, plain, absorbent, 1, 2, and 8 oz. cartons.
,, **Alembroth, Boric,** and [P1] **Cyanide,** each in 1 and 2 oz. cartons.

[P1] **Swabs, Cyanide.** Gauze, 4 × 4 inches, 12 in carton.

In addition, **Iodoform Gauze** (2 yards) and **Carbolised Wool,** 50, 100, and 250 Gm. are wrapped with aseptic precautions in similar cartons, but are not heated.

Combined cartons contain 1 ounce of plain absorbent wool with ½ yard plain absorbent gauze sufficient for a minor dressing, and combined cartons containing Alembroth Gauze (6 yards) with wool and gauze tissue suitable for a major operation.

Swabs, cartons contain : 12 small round pads suitable for eye-work ; 6 larger round pads (about 2 inches in diameter) ; 12 gauze. 6 inches square ; 12 wool and gauze tissue pads, 3 inches square ; **tins** contain 10 gauze covered swabs, 4 inches square ; also **tins** containing 10 swabs 6 inches square (*vide* also Triangular Swabs).

P1 **Swabs, Cyanide,** 12 in carton, 4 inches square.

Triangular Swabs have a pocket at one angle in which the finger or a probe can be introduced. For packing a cavity or wound during operation. In tins of 10 and 20 swabs. By counting the swabs left over the surgeon can be certain of not having left any in the wound.—Jackson Clarke.

Eye Pads, 1 doz. in carton.

Towels (Tins of 4), 18 × 32 inch.

Wrappers 6 feet long with slit in same, 10 × 2 inches, for abdomina operations, also 3½ feet long.

Abdominal Set in flat tin with key, contains 12 swabs 6 × 8 with tapes, 12 swabs 6 × 6, with tapes, 4 towels, 32 × 18 inches, 2 thick pads 6½ × 8½ inches (as dressing), with 6 safety pins, 1 bandage 4 inch × 6 yards, 2 wrappers with sleeves, twelve 4 inch × 3 yard gauze rolls, 2 veils for covering operator's and assistant's faces.

The Swabs have attached to them tapes which are left hanging outside any cavity into which the swab is passed—pressure forceps applied to the free end of the tape to prevent the possibility of the swab being left in the cavity.—J. Jackson Clarke, Medical Press, Sept 24/1913.

Eye Operation Set, No. 1, tin containing 3 Sterile Sets of the following :—12 small eye swabs, 1 special eye pad, 1 × 2½ inch bandage. (A set can be removed without impairing the others in any way.)

Eye Operation Set, No. 2, containing 1 × 2 inch bandage 4 eye pads, 4 pieces gauze, 1 oz. wool.

Preparation of Medicated Sterilised Dressings.

The following notes are intended to assist the pharmacist in preparing at short notice his own Sterilised Gauzes, Wools, etc. They are based on a paper by Beringer.—Am. Jl. Ph., Apl. 1911 (see Reprint in P.J. i./11,619) and some experience of our own in this class of work.

It has been necessary to add to Beringer's formulæ several for Gauzes largely used in the British Empire and to omit some which are not in demand with us.

Specially cleansed rooms are of course required for work of this kind All tables, floors, etc., should be scrupulously scrubbed with soap and Cresylic Disinfectant. The tables just prior to use should be washed down with 1 in 500 Perchloride Solution and then may well be covered with sheets of freshly sterilised parchment paper. Operators' hands, clothing, etc., require usual attention. Cartons, tins, wrapping paper, etc., should be heated in an oven at 120–150° C. for half an hour.

Absorbent Gauze.

The gauze suitable for use contains about 12 threads to the Cm., both on the wool and on the warp and is about 1 yard wide This is wrapped and sterilised in convenient lengths for surgeons' use.

Moist Absorbent Gauze.

Sprinkle the Sterile gauze with Sterilised Distilled water containing 5% Glycerin and pack in previously sterilised amber glass jars and sterilise again.

Boric Acid Gauze, 20% (Usually colored pink.)

Impregnate Gauze 100 with boiling Saturated Solution of Boric Acid tinted with magenta. Press out until it weighs 180 and dry.

Carbolised Gauze, 5%.

For this employ Phenol 5, Acetone 50, Water 50, Glycerin 5, to Gauze 100 as under Iodoform Gauze. (Dry).

Iodoform Gauze, 10% (Dry).

Dissolve Iodoform 10 in Acetone 100, saturate Sterile Gauze 100 with the solution, evaporate the Acetone.

Iodoform Gauze, 10% (Moist).

Proceed as for Iodoform Gauze (dry) incorporating about 1% Glycerin in the Acetone solution.

Ⓟ **Mercuric Iodide Gauze 4%.**
Impregnate Gauze 400 under pressure with a solution of Mercuric Iodide 1 and Potassium Iodide 1, in Water 800. Less Liquid, *e.g.*, Water 400 will work equally well by adjusting the pressure. We have also employed for this quantity a mixture of Acetone 200 and Water 200.

P1 **Mercuro Zinc Cyanide Gauze 3%.**
Prepare a suspension of Mercuro-Zinc Cyanide 3 in Sterile Distilled Water 600 tinted with rosaniline and mix evenly by stirring or shaking with Gauze 100. Dry without pressing.

In the manufacture of this Gauze note that much more water is required than usually advised.

Picric Acid Gauze 2%.
Picric Acid 2, Water and Acetone of each 50, Gauze 100.
Proceed as under Dry Iodoform Gauze.

Sal Alembroth Gauze 1%.
Impregnate Gauze 100 under pressure with a solution of Sal Alembroth 1 in Water 200 tinted with Anilin Blue. Less water may be used or a mixture of Acetone and Water, *e.g.*, Acetone 50 and Water 50.

Thymol Iodide Gauze 5%.
Dissolve Thymol Iodide 5 in Chloroform 25 and add Acetone 50. This quantity is suitable for 100 Gm. of Gauze.

All Gauzes should be sterilised at 120° to 150° C. for half an hour just before medicating.

If a steriliser be available—*c.f.*, Chapter on Sterilisation, a less temperature *e.g.*, 120° C. will be sufficient, furthermore the use of a vacuum apparatus will permit of excess of moisture being drawn off rapidly.

The preparation of **Wools,** and **Gauze and Wool Tissues** is on similar lines. We give brief notes of procedure under respective headings, *e.g.*, **Gossypium Carbolisatum, Gossypium Ferri Perchloridi, Gossypium Sal Alembroth, etc.**

Dental Dressings.

For Dental use are prepared —

Aseptic Dental Napkins to be used once and thrown away.

Absorbent **Dental Rolls.** As a substitute for the napkin or rubber dam. For covering the mouths of the salivary ducts, a section may be placed on either side of a tooth, or the entire roll may be bent round the outside of the arch or under the tongue. No. 1, diameter $\frac{5}{16}$ inch; No. 2, $\frac{3}{8}$ inch; No. 3, $\frac{1}{2}$ inch; No. 4, $\frac{5}{8}$ inch; in 1½ or 6 inch lengths.

Non-absorbent **Dental Rolls**—To replace the rubber dam. In crown and bridge work. May be used in connection with the saliva ejector.

Sterilised Absorbent **Pledgets** for wiping out cavities.

Aseptic Absorbent Points are prepared for drying pulp canals.

Sterilised Bibulous Paper, in sheets, 3 inches by 10 inches.

Carbonised Cotton for filling pulp canals, and for treatment of exposed pulps.

Cellulose Acetate is used for treating the fabric of the planes of aeroplanes. It is water resisting and renders the planes taut. The acetate acts as a preservative. It is combustible but not explosive.—C. F. Cross C.D. i./17,252.

DOPE.—The name given to a solution of Cellulose Acetate or Celluloid in Tetrachlorethan with Amyl Alcohol and Benzene. Cases of poisoning from inhalation of fumes of.—See W. H. Willcox, L. i./15,544, also W. E. Lee, L. i./16, 24.

Viscose.—When Carbon Bisulphide is added to Caustic Soda and wood pulp a chemical combination takes place. The substance swells and becomes water-soluble. This is the foundation of viscose used for capping bottles. The plastic mass spontaneously reverts to cellulose.—C. F. Cross, C.D. i./17,252.

This and **Artificial Silk** are made of Cellulose under Cross, Bevan and Beadle's Patent 8700/92. The patent was prolonged for five years.—S. W. Woolley. 'Enemy Patents and Trade Marks,' Oct. 24/18.

Gossypii Radicis Cortex.

The root bark from *Gossypium herbaceum* (*Malvaceæ*) and other, cultivated species is *Off.*. It contains about 10% acid resin.

Uses.—The following preparations are given instead of Ergot to check uterine hæmorrhage in all its forms. May relieve dysmenorrhœa.

Chemical Examination of the bark.—F. B. Power, P.J ii./14,420.

Extractum Gossypii Radicis Corticis.—Semi-alcoholic.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in pill.

$\boxed{\text{P1}}$ **Pilula Gossypii Composita.**

Extract of Cotton Root, Extract of Hydrastis, Ergotin, of each 1 grain (or in grammes for 15 pills). *Dose.*—One, 3 or 4 times a day.

Extractum Gossypii Radicis Corticis Liquidum, *Off.*, *Dose.*—½ to 1 drachm. The bark exhausted with a mixture of Glycerin 1, Alcohol (90%) 3 ; 1=1.

Flavoring.—Syl Lavandulæ, Glyl or Syl Cinnamomi.

Extractum Gossypii Seminis Pulverisatum.

POWDERED COTTON SEED EXTRACT. *S, n* .—✱LACTAGOL (T.M. 252851). *Dose.*—1 teaspoonful 4 or 5 times daily given in milk.

Said to increase the flow of milk and the nitrogenous constituents of same. According to the *Lancet* analysis it appears to consist practically entirely of protein substance, the total Nitrogen amounting to 15·68%.—L. ii./12,702.

Edestine. Stated to be the active principle, so far as galactogogue action is concerned, of cotton seed freed from fat, etc.—L i./12,830.

Edestine is also obtainable from *Linseed* by precipitation with water from a 4% Saline Extractive. *Vide* also Vol II. Peptic Index.

Tinctura Gossypii Radicis.

Dried bark of Root of Cotton Plant 1, Alcohol 60% 4.

Dose.—1 drachm (**4 Cc.**) three times a day.

GRINDELIA *Off.*, U.S.

Gum Plant.

The dried leaves and flowering tops of *Grindelia Camporum* are *Off.* The involucre, and often the leaves, are coated with a glutinous oleo-resin. The medicinal action is due to resins.

Uses.—For the spasmodic attacks which occur in asthma, whooping-cough, and bronchitis, and given in heart disease to slow and regulate the pulse.

Extractum Grindeliæ (by alcohol extraction).

Dose.—2 to 3 grains (**0·12 to 0·2 Gm.**) in a pill with lycopodium, three times a day.

Extractum Grindeliæ Liquidum, (*Off.*)

Exhaust herb with alcohol (90%), distil, add Sodium Bicarbonate to residue and water *q.s.* with alcohol (90%) one-fourth to make 1=1.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**) at the onset of a paroxysm of asthma, repeated every half-hour or hour, in sweetened water or milk. Useful for whooping-cough.

Flavoring.—Syl Pini (very good), Syl Lavandulæ.

Spiritus Grindeliæ Compositus.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in water every two to four hours while attack of asthma lasts.

Liquid Extract of Grindelia 15 minims, Sodium Iodide 2 grains, Nitroglycerin Solution ½ minim, Tincture of Euphorbia Pilulifera 20 minims, Spirit of Chloroform to 1 drachm.

Extractum Grindeliæ Compositum.

Dose.—1 drachm (**4 Cc.**) with a small quantity of Spirit, *e.g.*, 2 drachms of Brandy in ½ tumbler of hot water.

Liquid Extracts of Grindelia, Chekan and Yerba Santa each 1, Liquid Extract of Quebracho 3.

Suggested for use in asthma.

GRINDELINE.—*Dose.*—1 to 2 drachms in water every 2 to 4 hours. A speciality containing Liquid Extract of Grindelia 15 minims, Potassium Iodide 2 grains, Trinitrin $\frac{1}{200}$ grain, Tincture of Euphorbia pilulifera 20 minims in each drachm.

GUAIACI RESINA U.S.

The resin (a constituent to the extent of about 20%) obtained from *Guaiacum officinale* or from *Guaiacum sanctum* (*Zygophyllaceæ*). The resin contains chiefly (amorphous) guaiaconic acid and other constituents. The heart wood of these trees is **Guaiaci Lignum** (*Off.*)

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

Soluble almost completely in ether, chloroform, absolute alcohol and in sal volatile.

Petroleum Benzine Solution 1 in 5, should be colourless and not turned green by equal volume Cupric Acetate 1 in 1,000—absence of Resin U.S.

Uses.—In chronic rheumatism and lumbago, and for chronic sore throats; added to purgatives is useful in gouty persons, and for sluggish liver. It is a laxative in itself Diminishes sugar in diabetes.

For dysmenorrhœa the most reliable drug, best given in cachets. 10 grains of the resin to be taken three times a day. Sometimes this causes a little flatulence, colicky pain and diarrhœa; if so, it is well to add to each dose 1 grain of Dover's Powder. The patient should begin taking it a week before menstruation is expected.

Guaiacum combined with apiol to check painful menstruation may be given in malt extract, beginning a week beforehand, two or three times a day; also to relieve amenorrhœa.

Capsules of Guaiacum Resin, 5 grains; also **Tablets of Guaiacum Resin and Sulphur** 3 grains (0·2 Gm.) of each.

Useful for gout and rheumatism, *c.f.* **Chelsea Pensioner.**

Elixir Guaiaci.—*Dose.*—1 to 2 drachms. Guaiacum Resin 10, Tragacanth 1, Acacia 1, Syl Pini 50, Simple Elixir to 400.

We have designed this as a preparation suitable as a throat remedy, *e.g.*, in acute tonsillitis.

Tinctura Guaiaci Ammoniata. (*Off.*).

Dose.—½ to 1 drachm.

One of Resin in 5 of Ammonia-Alcohol Solvent, with Oil of Lemon and Oil of Nutmeg as flavourings.

Flavoring.—Syl Pini; Syrupus Zingiberis.

Tinctura Guaiaci, U.S. *Average dose.*—1 drachm. 1 in 5 alcohol (94·9% vol.).

Trochisci Guaiaci Resinæ (*Off.*). Three grains of Guaiacum Resin with fruit basis.

HAMAMELIDIS CORTEX ET FOLIA.

Witch Hazel Bark and Leaves.

Dose of bark. twigs, and dried leaves, 30 grains (U.S. VIII.—now no longer in U.S.)

The bark and leaves, fresh and dried, of *Hamamelis virginiana* (*Hamamelidaceæ*)—*Off.* Witch Hazel is imported from the United States; it possesses astringent properties.

Uses.—To check hæmorrhages and excessive mucous discharges, and for piles. They form the basis of the American Specialities—∗Pond's Extract (T.M. 2786/7), (*dose,* 10 drops half-hourly), and ∗Hazeline (T.M. see 22388, 25193, 26510, 230425, 251717, 256789), (*dose.* $\frac{1}{2}$ to 3 drachms).

Liquor Hamamelidis of Commerce, a distillate of the fresh leaves containing about 14% alcohol by volume. Sp. Gr. about 0·980.

Dose.—$\frac{1}{2}$ to 3 drachms (**2 to 12 Cc.**), and used externally for piles and by rectal injection for internal piles, and to check epistaxis, bleeding from tooth sockets, and is applied to bruises.

British Made Liquor Hamamelidis.—We had occasion recently (1918, to distil a small quantity (1 gallon) of this from (fresh) leaves cultivated in this country by E. M. Holmes. The aroma was excellent.

For piles, 5 minims of a mixture of equal parts of the liquor and glycerin containing 10% of Phenol, injected into piles hypodermically with advantage.—

Further details on this Liquor, see Vol. II.

Hazel Foam (**Martindale**). A soothing, non-greasy ointment basis. May be medicated with all forms of antiseptics and skin applications, *e.g.*, Ichthyol 3%; Ichthyol 3 to 10% with Resorcin 5%; Salicylic Acid 1%; Liquor Carbonis Detergens 10%; Cade Oil 5%; Carbolic Acid 1 to $2\frac{1}{2}$%.

Cremor Hamamelidis L.H.

Solution of Hamamelis 60 minims, Soft Paraffin 120 grains, Wool Fat (Anhydrous) to 1 ounce.

Fluidextract, U.S., was a glycero-hydro-alcoholic percolate 1=1.

Flavoring.—Syl Lavandulæ, Syl Menthæ Piperitæ.

Hamamelin.—*Syn.* **Hamamelidin.**

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) in pill. The powdered extractive from the bark, of a purplish-brown colour. It is also supplied commercially of greenish colour made from the leaf.

A Suppository of 1 to 3 grains with cacao butter is useful for piles

Ⓟ**Compound Hamamelis Suppository.**—Hamamelin 1 grain, Orthoform 5 grains, Cocaine Hydrochloride $\frac{1}{2}$ grain, Opium Extract $\frac{1}{6}$ grain, Belladonna Extract $\frac{1}{6}$ grain, Cacao Butter to 60 grains. For internal hæmorrhoids.

Ⓟ **Suppositoria Hamamelin, Conii et Eucainæ.**

Hamamelin 5 grains, Conium Extract 4 grains, Eucain ½ grain, in Glycerin Suppository Mass to 30 minim size. Rub down the drugs with a very little warm water and mix with melted Suppository Mass. In painful hæmorrhoids.

P1 **Suppositoria Hamamelin et Hydrargyri Composita.**

Mercurial Ointment 1 grain, Hamamelin 2 grains, Ergot Extract 1 grain, Belladonna Extract 1/6 grain, Morphine Sulphate 1/6 grain, Tragacanth *q.s.*, Cacao Butter to 15 grains.

The ingredients are used with following intent:—The Mercury to act on prostatic hyperæmia often present with piles. Hamamelin on the mucous membrane, Ergot on the muscular walls of blood vessels, Belladonna the same and sedative, Morphine analgesic and vaso-constrictor. The Theobroma Oil as local mechanical lubricant, and the Tragacanth for consistency.—Campbell Williams.

Tinctura Hamamelidis (*Off.* and 1898).

Bark, in No. 20 powder 1, Alcohol (45%) *q.s.* to 10.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Is given quite irrationally to check bleeding from the lungs or other organs The tannin to which its local action is due is converted into sodium gallate on reaching the blood—this substance has no remote astringent action.—B. P. C

An injection for bleeding piles, 1 drachm of the tincture in 3 ounces of cold water should be given as an enema, and retained, at bedtime or before breakfast, every day; or the Ointment applied locally.—R

A lotion of 1 or 2 drachms with water to an ounce, is a useful application to bruises and small wounds.

Unguentum Hamamelidis (*Off.*).

Same strength in Liquid Extract of Hamamelis as B.P , '98, but basis altered. This Ointment is largely employed for piles.

'**Collapsubes**' of this are prepared with rectal tube for piles, *vide* also **Hollow Suppositories.**

Also P1 **Collapsubes' of above with Cocaine** 2%.

The following is said to work satisfactorily:—Heat on a water-bath Liquid Extract of Hamamelis 2, Starch 1, Glycerin 7, until a jelly is formed, then add Hydrous Wool Fat 8 and Petroleum Oil 2.—P J. ii./11,631.

HEXAMINA (*Off.*)

Syn. **Hexamethylenetetramine. Hexamethylenamina, U.S.** P.G.V., **P. Jap., Urotropine, Aminoform, Formin, Formamine, *Cystamine** (T.M. 231536). **Cystogen, *Metramine** (T.M. 370133). **Uritone, *Vesalvine** (T.M. 278095).

Trade Mark: 'Urotropine' No. 215652 ***Avoided*** by Board of Trade.—P.J. i./15,339,646.

$(CH_2)_6N_4 = 140{\cdot}166$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in a large volume of water, or it may be carbonated water.

For children, 3 to 4 grains in water 4 to 5 times during the day.

Manufacture.—It is most easy to make: Mix 1 Volume of Commercial Formalin Solution with 2 Volumes of Liquor Ammoniæ (10%). Allow to stand for a few hours in a loosely covered vessel, and evaporate on the water bath to dryness, taking care that Ammonia is in excess during the process. Recrystallise from Alcohol.

Flavoring.—It has only slight bitter taste. Syl Lavandulæ, Syl Rosæ; Syrupus Aurantii.

Colourless crystals, sublimable. *Soluble* 1 in 1½ of water with alkaline reaction, in Alcohol 90% 1 in 8, almost insoluble in Ether. A valuable diuretic and solvent of Uric Acid concretions.

It burns with intense heat and without soot. A 5 grain tablet will boil a test tube half-full of water.

Uses.—It relieves cystitis associated with putrefaction and destroys typhoid bacilli in the urine. The pyuria of tabes dorsalis, cholelithiasis and gonorrhœa (early stages) have been well treated.

Discussion has taken place as to the manner in which this drug should be given in cystitis. The substance decomposes, liberating Formaldehyde more readily in presence of Acid than Alkali, hence simultaneous administration of Sodium Acid Phosphate is advised.

Investigation of the subject in our laboratories shows that though the amount of Formaldehyde liberated from therapeutic doses of Hexamine cannot be sufficient to kill *B. Coli, the slow generation of Formaldehyde by the drug in the presence of Acid has the desired effect.* It is preferable therefore to raise the acid index of the urine within reasonable limits. *For details of our Work, see Hexamina, Vol. II.*

Common Colds can be aborted by Hexamine. The drug is stated to be excreted by the saliva and bronchial mucous membrane, hence the idea. It should be given at once when the discomfort begins.—15 grains four times during 24 hours in water. Patient should drink water copiously to reduce bladder irritation.

Respiratory affections (acute bronchitis, acute rhinitis, etc.) well treated. Keep patient indoors, give Cotoin ¼ grain with Soda every 15 minutes for four doses, 6 hours later Magnesium Sulphate 2 teaspoonsful, then Formamine 10 grains (adult) in full glass of water at first thrice and subsequently twice daily. Rhinitis and bronchitis were cured in 3 to 5 days; influenza in from 5 to 7 days. No untoward effects were observed, even when as much as 30 grains daily were given.—Pres. Oct. 1912,257 ; B.M.J. i./14,1158.

In aural suppuration and meningitis Hexamine has been tried, but neither it nor Formaldehyde could be detected in the discharge nor cerebro-spinal fluid.—D. Guthrie, B.M.J. ii./16,455.

In whooping cough may also be of value *e.g.* combined with Syrupus Thymi.

Pellagra treated with 15 grain doses, *t.d.*—Jl. A. M.A., 1910, p. 1663.

Sufficiently large doses (75 grains *per diem*) will inhibit growth of bacteria in the bile, *e.g.*, in typhoid. Suggested for treatment of infections of the biliary passages and as a protective measure before operations on the gall bladder or bile ducts. Also for its antiseptic action in threatened or actual cerebro-spinal infections. Experiments on animals show that it may be of value in preventing meningitis. Its prompt use *per os* conveys it to the cerebro-spinal fluid in 30 to 60 minutes. In 35 cases of fracture of the base of the skull with bleeding or escape of cerebro-spinal fluid from the nose or ears meningeal infection never occurred.—Pr., Nov., '09,720; L. ii./12,1231.—Glas. Med. Jl., Nov., 1912.

Acute poliomyelitis. Child aet. 11 became acutely ill suddenly. Weakness of legs. Temperature 104. Hexamine 10 grains every four hours. After two days temperature lower but paralysis more marked. Next day improvement but in the evening after 150 grains had been given, hæmaturia with considerable strangury occurred. After three days paralysis ceased and ultimately the renal symptoms. Complete recovery in sporadic cases is rare.—N. Fox Edwards, B.M.J. ii./16,620.

In bladder diseases 20 to 40 grains daily suffice, while in gall bladder infection, or purulent meningitis, from 200 to 300 grains daily may be required. Give well diluted (2 grains to the ounce of diluent) *per os* or it may, if necessary, be given by rectum or subcutaneously.—A. C. Burnham, Med. Rec., July 5/13, per Pres., Oct., 1913.

Ringworm of the beard. Treatment.—A 5 to 10% solution of Urotropin is sponged on the part affected. This is allowed to dry and a solution of Dilute Sulphuric Acid 1 to 3% is then sponged over the affected area. There were most gratifying results in the condition known as "foul shave." Where the parasite is the ringworm fungus this method is undoubtedly a specific.—It cured the most chronic case when continued for 4 or 5 weeks in gradually increasing strengths.—J. Craik Taylor.

General paralysis treated with 10 grain doses. Said to produce dilute Formaldehyde solution in the cerebro-spinal fluid.—M.P.C. i./14,332.

Vesalvine Tablets 5 grains and **Vesalvine Effervescent,** 5 grains in 1 drachm are prepared.

Hexamine Triborate. *Syn.* ∗BOROVERTIN (T.M. 317305). $(CH_2)_6N_4.3HBO_2$ = 272·19.

Dose.—15 to 60 grains (**1 to 4 Gm.**) daily.

Manufacture.—By combining 1 molecule Hexamethylenetetramine with 3 molecules of Boric Acid—$3H_2O$ are set free and the Boric Acid is converted into Metaboric Acid.

Crystalline powder containing about 50% Hexamethylenetetramine, readily soluble in water, taste bitter. Urinary antiseptic, *e.g.*, in gonorrhœal cystitis, pyelitis, renal calculus and tuberculosis of the bladder and kidneys—not always successful.

∗Vesalvine 'B.' *Syn.* HEXAMETHYLENETETRAMINE BENZOATE $(CH_2)_6N_4.C_6H_5.COOH$. = 262·249.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Small scaly crystals containing about 53% of the base. Made by combining equivalent quantities and crystallising. Soluble 1 in 50 of Water and 1 in 2½ Alcohol 90%.

Uses.—As an urinary antiseptic.

∗Cystazol (T.M. 364369). *Syn.* Hexamine-Sodio-Benzoate.

Tablets.—10 grains (**0·6 Gm.**).

Dose.—One to three dissolved in water twice or thrice daily, in bacterial infections of the urinary tract.

∗Uro-Hexoids (T.M. 365610). Tablets of HEXAMINE AND LITHIUM BENZOATE.

Dose.—One or two after each meal, taken whole or crushed and dissolved in water. Urinary Antiseptic, Diuretic and Anti-lithic.

In cystitis, pyelitis and tuberculosis of the bladder and kidneys, also for chronic posterior urethritis and prostatitis and rheumatic affections.

∗Vesalvine 'S.' *Syn.* HEXAMETHYLENETETRAMINE SALICYLATE. $(CH_2)_6N_4.C_6H_4.OH.COOH$ = 278·249.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in water, preferably on an empty stomach.

Colourless prismatic crystals with agreeable sweetish saline taste, containing approximately 50% of each constituent. Prepared by combining equimolecular proportions.

Soluble 2 in 1 in Water and 1 in 2 in Alcohol.

Uses.—This salt should be especially useful as an urinary and intestinal antiseptic, *e.g.*, in cystitis, bacilluria, gastro-intestinal catarrh, colitis, dysentery, diarrhœa, dyspepsia, and all cases beneficially treated by hexamethylene-tetramine—it is exceedingly soluble. It doubtless splits up on passing through the system into its two constituents,—the Salicylic Acid enhancing the antiseptic effect of the Hexamethylenetetramine.

Note.—Though so markedly soluble in water there apparently exists a state of dissociation in solution, for example, Solutions of strength 1%, 3%, 6%, 12%, 25%, 50% and saturated remain clear for months, whilst vigorous rubbing on the sides of the vessel will cause a deposition of Salicylic Acid crystals.

Analysis.—Estimate Salicylic Acid content by titrating with N/10 Sodium Hydrate, using Phenolphthalein as indicator. 1 Gm. should require not less than 34 Cc.

Incompatible with Acids, Alkalis and Carbonates, also with Sodium Salicylate—it throws the Salicylic Acid out from same—and otherwise as Salicylates in general, hence best administered as such—not in a 'mixture.' It decomposes on heating either in water or alcohol on the water bath.

Vesalvine 'S' Tablets 5 grains and **Vesalvine 'S' Cachets** 5 and 10 grains, also **Elixir Vesalvine 'S'** 5 grains in 1 drachm, are prepared.

Lancet Laboratory Analysis and Description.—L. i./13,903.

A dose of 15 grains produced slight dull feeling in the head. This was not felt with 7½ grains.—W. H. M.

A medical man—a sufferer from urinary bacillary infection—found a few doses cleared the urine in 3 days, and that the preparation does not irritate the bladder like other antiseptics of which he had tried practically all.

Hexamethylenetetramine Camphorate *Syn.* ✱ **Amphotropin** (T.M. 338474) $[(CH_2)_6N_4]_2C_8H_{14}(COOH)_2 = 480{\cdot}51$.

Dose.—8 to 12 grains (**0·5 to 0·8 Gm.**). Tablets 8 grains (**0·5 Gm.**).

A white crystalline powder made by combining in Alcohol, Chloroform, etc. Subject of a patent 21728/12.—P.J. ii./12,783.

Soluble in water 1 in 10 with acid reaction. Solutions are hydrolysed to a great extent.

Uses.—Urinary antiseptic. An alkaline urine is rendered neutral or acid by administration. In chronic cystitis, bacteriuria, nephritis. —P.J. ii./12,652; L. i./13,1324.

New Urotropine. *Syn.* ✱HELMITOL (T.M. 322538), FORMAMOL.

Dose.—15 grains (**1·0 Gm.**) (to 30 grains in chronic cases.—W. W. W.). Said to be the anhydro-methylene citrate of hexamethylenetetramine.

Hexamine-Resorcin. *Syn.* DIOXYBENZOL-HEXAMETHYLENETETRAMINE, ✱HETRALIN (T.M. 257273).

Dose.—8 to 30 grains (**0·5 to 2 Gm.**) are also urinary disinfectants.

Hexamine - Sodium Acetate, *Syn.* ✱ **Cystopurin** (T.M. 288836). Stated to have the composition

$$(CH_2)_6N_4.2CH_3COONa+6H_2O=412{\cdot}33.$$

Containing approximately 34% of Hexamine.

(✱**Cystoformin** (T.M. 374328) is a proprietary preparation of this kind containing 40% of Hexamine).

Dose.—30 grains (**2 Gm.**). A crystalline salt made by evaporating solutions of the components in the above proportions. In gonorrhœa and cystitis.—F N., 1908,64. **Tablets** contain **1 Gm.** (15 grains).

∗**Urodonal** (T.M. 361117). A granular effervescent preparation of hexamethylenetetramine, Sidonal and Lysidine.

Dose.—3 teaspoonsful during the day. The three components are stated to be useful in removing uric acid and allied bodies. Claimed to be of value in rheumatic affections.

HYDRARGYRUM.

Hg = 200·6.

Antidotes to Acute Poisoning by Mercurial Salts.—Emetics by mouth, Apomorphine hypodermically; white of 1 egg for every 4 grains of Perchloride (avoid excess), or milk; reduced iron; alcohol or ether for collapse; and opium for pain.

Uses.—Purgative, cholagogue and antisyphilitic.

Purification of Mercury. Allow it to flow in a thin stream through a long column of Nitric Acid. Wash and filter through chamois leather.

Hydrargyrum cum Creta. (*Off.* and B.P. 1898) *Syn.* **Grey Powder.** *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm**).

Contains 33½% Mercury. Is said to become stronger on keeping by oxidation. That of U.S. is prepared with Mercury 38, Clarified Honey 10, and Prepared Chalk 57. Moistened *q.s.* and dried—has sweet taste and is somewhat damp.

Smallpox (3 cases of confluent) treated with 10 grain doses thrice daily. Result surprisingly good.—Mercury appears to abort the disease and produces no ptyalism.—B.M.J. ii./10,120.

Injectio Hydrargyri Intramuscularis "10%." *Syn.* INTRAMUSCULAR INJECTION OF MERCURY. F. J. Lambkin's original formula.—B.M.J. ii./05,1257,1348.

Mercury 1 ounce (troy), Anhydrous Lanoline 4 ounces, Liquid Paraffin (Carbolised 2%) to 10 ounces (by volume).

Dose.—This contains 1 grain in 10 minims,—the maximum dose once a week. Physicians should specify '10%' using the above name in full to prevent confusion with stronger preparations.

Sterules, Hypodermic, are prepared containing 10 minims.

Site of Injection.—An area around a point midway between the gluteal cleft and the anterior superior iliac spine is best.—G. Pernet, L. ii./09,216. *Sterilise Syringe in Liquid Paraffin.*

Experiments which we conducted showed that this suspending mixture is probably as useful as any. It holds up the mercury even in hot weather—of great importance for accurate dosage. We compared it *inter alia* with various formulæ containing Cocoa Nut Fat and Vaselin Oil, but came to the conclusion that the cocoa nut fat did not improve matters. Some preparations yield a heavy precipitate at tropical heat.

The preparation is slowly absorbed and practically painless. 50,000 injections were made without untoward result. (Nevertheless, caution is necessary.—W. H. M.).

Diarrhœa may be caused by these injections and warded off by 5 grain Cachets of Bismuth Salicylate.—B.M.J. i./07,732.

Mercurial Cream, Lambkin, is now a special preparation (1 grain in 10 minims) of a fatty basis containing **Palmitin** (from Palm Oil). In addition it contains Creosote and Camphoric Acid of each 10% (or 20% of the compound called ✱ '**Creocamph**' (T.M. 294289). The Creosote and Camphoric Acid prevent the occurrence of pain sometimes supervening 3 or 4 days after the injection.—L. ii./07.14.

For details and refs. as to priority in this formula *vide* Edn. XIII.

Before using Mercurial Cream, Lambkin begins with *weekly* injections of **Calomel Cream** containing 5% Calomel in the same vehicle. *Dose.*—10 minims = ½ grain of Calomel. *c.f.* also **Injectio Hydrargyri Subchloridi Hypodermica.**

No Salt of Mercury comes up to Calomel for removing active signs of the disease, but the effect is only transitory in comparison with metallic mercury (¾ grain of Calomel is given once a week for four weeks and *then* metallic mercury). Calomel suspended in Olive Oil is exceedingly painful. The addition of Creosote and Camphor produces analgesia—and can be given with impunity.

Lane's advice of ⅔ grain Calomel once weekly for 15 or 16 weeks not approved of. A rest from treatment is necessary. The maximum number of injections need never exceed eight, more often six. Then a rest period of two months from all injections is given.—B.M.J. i./09,123 ; L. i./09,396.

Old people, broken down Alcoholics, those with renal disease, with Albumin in the urine, tubercular subjects, those with lead poisoning and gouty persons should not have the treatment.—B.M.J. i./07,732.

Injectio Hydrargyri.—STAFF SURGEON ADAMS' FORMULA. ROYAL NAVY FORMULA (G. B. Scott, Roy. Com. on Venereal Diseases).

Dose.—5 minims (=1 grain of Mercury) given once a week. Mercury 20, Anhydrous Lanolin 30, Chlorbutol 2, all by weight, Liquid Paraffin to 100 by measure.—*Vide* Pr., November, 1910.

Huile Grise, FR. CX. *Syn.* GREY OIL, OLEUM CINEREUM.

Dose.—An injection of 2 to 3 grains (**0·12 to 0·2 Gm.**) = ⅔ to 1 grain Mercury approx. (**0·04 to 0·06 Gm.**), every eight days for 5 or 6 weeks—or up to seven divisions of the Barthelemy's syringe (*v. infra*), *i.e.*, **0·07 Gm.** Mercury.

Mercury 40, Wool Fat 26, Vaselin Oil (FR. CX.) 60—all by weight. Measures 100, *i.e.*, 40% w/v. Mercury (**0·4 Gm. in 1 Cc.**).

FR. CX. gives method to produce a thoroughly sterile product.

Barthelemy's Syringe (used in France) is graduated so that when used with a 40% *w/v.* Grey Oil, 1 c gr. of Metallic Mercury is contained in each of its divisions ; 14 c gr. or approx. 2½ grains in the syringe-full.—L. i./09,499,647.

Fournier's Syringe is ½ Cc. in capacity divided into 10 on the barrel so that each division represents 2 c gr. of mercury using the 40% w/v. product.

Levy-Bing-Lafay-Syringe has piston rod graduated into 15 divisions, each of which represents 1 c gr. using the above.—L. ii./09,214.

A 10% preparation, e.g., the **Injectio Hydrargyri Intramuscularis** at the commencement of the Chapter suits the ordinary hypodermic syringe better, and is safer as being *more accurately measurable* than the 40%.

Suppositories containing the 40% Grey Oil in various strengths have been used in syphilis. Efficacious, simple, and safe.

Syphilitic 'reinfection' after nine years. 'Remercurialisation' at successive and even distant intervals as important as revaccination.—L. ii./09,1071 L. ii./08,105.

There are cases of syphilis in which mercury cannot be injected satisfactorily, but better results occur when it is given *per os.*—Latham, P.R.S.M., Clin. Sect., Dec. 10, p. 21.

Mercurial treatment of syphilis has been followed by deaths—mostly from the insoluble preparations, especially Grey Oil—the danger of insoluble preparations applies equally to Mercury and Arsenic.—L. i./11,502.

Suggestion that a long course of Mercury may render the tissues more vulnerable rather than less so to a future state of activity of Spirochætæ. Mercury is a foe to syphilis but a friend to tertiary ulceration. Better to give Mercury (and Salvarsan) only to remove actual *manifestations* of syphilis and not with view of preventing subsequent signs. Neither drug will *cure* syphilis. —R. S. Wainewright, L. ii./13,1225.

Mercurial Injections (Summary).

Either (i.) Soluble or (ii.) Insoluble Mercurials are used :—

For further details of these solutions see body of text.

1.—Soluble Mercurials.

(The solutions and suspensions are best supplied in **Sterules** or 1 oz. wide-mouth stoppered bottles to admit of introduction of syringe.)

Ⓟ**Sal Alembroth.** Rather painful, slowly eliminated, fairly rapid in action.

Hydrargyri Bromidum in solution with Sodium Bromide, comparatively painless.

P1 **Hydrargyri Cyanidum.** Almost painless, but very poisonous, may cause diarrhœa and albuminuria.

P1 **Hydrargyri Oxycyanidum.** As the latter.

Ⓟ**Ragazzoni's Mercuric Iodide and Sodium Iodide Solution.** Does not cause toxic symptoms. Its intramuscular use is painful.

Hydrargyri Lactas. A soluble, safe salt rapidly eliminated and hence repeated dosage necessary.

Ⓟ**Hydrargyri Perchloridum.** Employed both as intravenous and intramuscular injection. Causes pain and may set up local induration.

Hydrargyri Iodophenol-Sulphonas. Safe, efficacious, and painless. But it has objections.—*Vide* B M.J. ii./05,1255. *Dose.*—10 to 15 minims intramuscularly, of a solution of the Compound 2½ grains with Sodium Iodide 5 grains, in Water 100 minims, *i.e.*, ¼ to ⅓ grain.

Hydrargyri Succinimidum. Safe and comparatively non-irritating. *Dose.*—¼ to ½ grain in 10 to 15 minims water (2½ grains in 100 minims)

The Succinimide, or the Iodophenol Sulphonate are probably the least painful—the intramuscular injection of soluble Mercurials in general is preferable to insoluble, combined with the internal administration of Mercury in the form of Calomel and inunction with 5% Mercuric Oleate.—Campbell Williams.

The soluble mercurials may be introduced by Iontophoresis. *Vide Vol. II.*

2.—Insoluble Mercurials.

Hydrargyrum suspended in an oily vehicle. The mercury is probably converted into albuminate in the system.

Hydrargyri Salicylas Neutrale.
Dose.—$\frac{3}{10}$ to 1 grain.
Suspended 10% in liquid paraffin. Non-irritant and effective.

Hydrargyri Subchloridum. Causes pain. Exerts a marvellously rapid remedial action on syphilitics. *Par excellence* for endarteritis and its sequelæ.

Best given as 10 to 15 or even 20 minim doses containing respectively ½, ¾, or 1 grain of the salt suspended (10%) in sterile olive oil. The larger doses with caution. Employ morphine ¼ grain hypodermically to relieve pain.

Intravenous Injections of Mercurials are said to be painless, have small dose, are certain of absorption, rapid of action, and do not salivate

Difficulties of the method, of obtaining consent of patient, possible thrombosis, pyæmic infarction, necessary daily injection. Violent dysenterodiarrhœic symptoms or polyuria and even albuminuria may result.

Solutions of mercuric cyanide, 20 minims of 1% solution (*i.e.*, ⅕ grain), oxycyanide, biniodide, succinimide and perchloride have been used.

Linimentum Hydrargyri (*Off.*).

Is now about 3/5 strength of B.P. 1898.

Useful stimulant for enlarged joints and glands.

In affections of the peritoneum involving the lower quadrants of the abdomen or pelvis Mercury is without rival. In appendicitis Mercury inunction reduces the pain, mitigates thirst, and effects copious evacuation and urination, also suitable in all cases of infection of the peritoneal serous membrane.—M. Arch. Jan. '05, No. 1, p. 2.

Mercurettes. Oblong Blocks containing 30 grains of mercury incorporated with 60 grains of Cacao Butter. With brisk rubbing spreads over the skin and penetrates. The firm consistence is agreeable in use.

By warming may be spread on the linen to form a mercurial plaster (non-adhesive) for use in synovitis, chronically enlarged glands, and arthritis or for aborting boils and carbuncles.

Pilula Hydrargyri (*Off.* and B.P. 1898), **Blue Pill.** *Dose.*—4 to 8 grains (**0·25 to 0·5 Gm.**).

Contains 33% Mercury by weight.

In raised arterial tension when indicative of danger, a pill twice or thrice weekly, followed by Saline is beneficial.—Brunton.

In syphilis, begin with 3 grains a day after the first and last meal, increasing the daily dose by 1 grain each week till patient is taking 2 grains thrice daily. An average dose is 2 grains twice a day.

When the wife has become pregnant after a chancre has appeared on the husband, and has become exposed to infection during pregnancy, Mercury should be given at once.—Beddoes.

Effect in cardiac dropsy most striking. Its action seems to be complementary to digitalis and to prove efficient where latter has failed to increase urinary secretion materially. It is to be avoided if renal disease be present. When diuresis is fully established discontinue Mercury and give a mixture of Caffeine and Spirit of Nitre with Infusion of Broom Tops.—B.M.J. i./11,292.

✱**Mercurol,** (T.M. 228096) (*c.f.* **Nargol.**)

A combination of mercury with nuclein. Used for gonorrhœal injections ½ to 2% solutions.

Has been given internally in syphilis in 2 grain doses.

Unguentum Hydrargyri (*Off.*).

Off. is now 30% Mercury, as required by F.I. B.P. 1898 was Mercury 16, Lard 16, Suet 1. Principally used for inunction in syphilis. To relieve local inflammation and to destroy pediculi.

Fr. Cx. (*Onguent Napolitain*). Mercury 1, Benzoated Lard 1.

U.S.—Mercury 50, Oleate of Mercury 2, Suet 23, Benzoated Lard 25.

Unguentum Hydrargyri Dilutum, U.S. Mercurial Ointment (U.S.) 60, Petrolatum 40.

Inunction treatment of syphilis.—5 Gm. initial dose of Mercury Ointment B.P. '98 diluted to 33%. Directions for treatment of gingivitis if this occurs. Paint with 10% Chromic Acid, or stronger up to even 75%. Give Mineral Waters—Aix la Chapelle, Uriage, Harrogate, etc.—D. Freshwater, Pr. Mar. 1912.

Unguentum Hydrargyri Compositum (*Off.*) is now about 3/5 of '98 strength). B.P. 1898 was Mercury Ointment 10, Yellow Beeswax 6, Olive Oil 6, Camphor Flowers 3. *Scott's Dressing, modified.*

For enlarged glands, chronic synovitis and syphilitic nodes.

Swelling of the ankles well treated by this dressing—recovery in 3 weeks after 3 years' suffering.—L. ii./09,295.

In tuberculous peritonitis, the mercurial, *e.g.*, Scott's Dressing, not to be rubbed vigorously into the abdomen.—B.M.J. ii./11,47.

Unguentum Hydrargyri Mite, B.P.C. *Syn.* **Blue Unction.**

Mercurial Ointment 1, Lard 2. Mix. For destroying lice.

To promote the removal of the effusion of pleurisies, the rubbing into the chest of half a drachm of Mercurial ointment twice daily is often useful.—Burney Yeo.

Lanolinum Hydrargyri.

Mercury 100, Lanolin (Hydrous) 200, Mercurial Ointment 5, Mutton Suet 50. For inunction in syphilis (effect is rapid); used daily 4 to 8 times after a hot bath. *See also* **Mercurial Injections.**

Inunction *at night* probably prevents pullulation of the Spirochaete on the surface of the body—a habitat which these organisms find particularly favourable for perpetuation of their species by transmission to another individual.—L. i./09, 489. Sp. Pallida appears to swarm at night in the tissues of indurated chancres, at any rate.

In hospital practice (army), inunctions and baths for in-patients, with weekly grey oil injections for out-patients, gave satisfaction.—L: ii./11,1386.

Scleroderma with obstinate callous ulcers on the legs improved under mild Mercurial inunctions.—P.R.S.M.—Dermatology Section, Nov. '10, p. 13.

In England evidence is wanting as to insoluble Mercury Injections being best method of treating syphilis. One thorough course of inunction of Unguentum Hydrargyri ⅔ drachm in Lanolin or other base ⅓ drachm, in the early stages (first six months) is of inestimable value. Requires care but mortality is small—far less than in the case of injections of Salvarsan.—Maj. French, B.M.J. i./11,593.

Discussion on the Treatment of Tabes Dorsalis.—The view is held that syphilis is the important etiological factor without which there would be no such disease as tabes. Inunctions or injections were superior to Mercury by the mouth, and perhaps better by inunction than by injection.—B.M.J. ii./10,1249. Pseudo-tabes—the result of syphilitic meningitis—treated by inunction.—B.M.J. i./09,1403.

Mercury Amalgam.

This is one of the most popular of dental fillings.—"Black" Cosmos. Vol. xxxviii. page 991, suggests the following:—Silver 68·5, Tin 25·5, Zinc 1, Gold 5.

In use, the alloy is worked up in a glass mortar with an equal quantity of Mercury, and the excess of Mercury is squeezed out immediately before filling in. It is the general rule to employ a double filling, *i.e.*, to insert an initial filling of zinc oxy-sulphate or oxy-phosphate, *q.v.*, and afterwards an amalgam whenever a metal filling is employed, and where the depth of the cavity will allow.

Ⓟ Hydrargyrum Ammoniatum. (*Off.*). U.S. P.Dan.

Mercuric Ammonium Chloride, $Hg.NH_2Cl$ (U.S.) = 252·086. **White Precipitate.** A white powder, insoluble in water but soluble in hydrochloric acid.

Ⓟ Unguentum Hydrargyri Ammoniati (*Off.*).

Strength 5% in Benzoated Lard.

Benzoic Acid in the Benzoated Lard in B.P. *Ung. Hyd. Ammon.* causes the preparation to become faintly yellow in colour. Plain lard does not cause the colouration.—H. Stout, P.J. i./17,187.

In pruritus and other skin affections.

Ⓟ**Unguentum Hydrargyri Ammoniati Dilutum, N.H.W.** Equal parts of the B.P. 1898 ointment, (1 in 10 of Paraffin Ointment), and soft paraffin (white).

Pustular eczema, resulting from pediculosis capitis in weakly children, well treated with equal parts of this ointment and olive oil, and enclosing in oiled paper cap.—B.M.J. i./09,1342.

Ⓟ**Unguentum Hydrargyri Ammoniati, U.S.**

1 in White Petrolatum 5, and Hydrous Wool Fat 4.

Tinea circinata can be rapidly cured by this ointment.—L.i./09,966.

Unguentum Prophylaxis. For prophylactic measures against syphilis. Metchnikoff suggests the use of Lanolin Ointments containing Ⓟ White Precipitate 25% or Calomel 25%, or $\boxed{P1}$ Mercuro-Salicyl Arsenate (*q.v.*) 25%. (*Physicians should specify which is required when prescribing Unguentum Prophylaxis.*) These are less irritating than Mercurial ointment. To be used by inunction for 4 or 5 minutes after coitus.—B.M.J. ii./07,1075; L. ii./08,407. Not efficacious invariably with monkeys.—Neisser.

For use in the Navy—Calomel Ointment 33% made with Lanolin; 50% strength also mentioned in the same paper.—B M.J ii./08,394.

Medical men, students, and nurses advised to have the ointment handy to apply to any suspicious crack about the fingers, etc.

Early application of an ointment of Calomel 10 and Lanolin 20 is said to have prevented syphilitic infection by killing the Treponema.—L. ii./11,1386.

Gelatin Capsules of the ointment, with elongated points to be torn off, and 'Collapsubes' of the ointment are prepared.

Unguentum pro Eczema (Blackfriars H.), N.H.W.

Ammoniated Mercury 10 grains, Lead Acetate 10 grains, Zinc Oxide 20 grains, Mercuric Nitrate Ointment 20 grains, Soft Paraffin ½ ounce, Lard ½ ounce.

Ⓟ**Cremor Lowndes.**—Ammoniated Mercury Ointment 1, Zinc Ointment 3, Glycerin 2, *misce s.a.*—Squire.

Hydrargyri Benzoas. **Mercuric Benzoate.** FR. CX.

$Hg.(C_6H_5COO)_2.H_2O = 460{\cdot}766.$

Dose.—$\frac{1}{50}$ to $\frac{1}{10}$ grain (**0·0013 to 0·006 Gm.**)

A white crystalline powder, practically insoluble in cold water (not even with sodium chloride added, as recommended by some), ***soluble*** about 1 in 180 of Alcohol 90%. In pill for syphilis. Injected, large doses necessary and Cocaine may be added.—B.M.J. ii./05,1255.

Intramuscular injections in uterine hæmorrhage said to surpass Ergot.—B.M.J. ii./04,1085.

Septic infections such as septicæmia, pyæmia, erysipelas, puerperal fever, septic sore throats treated by Mercury Benzoate Injections—10 Cc. of 1% Solution which represents average of 1·5 mgr. per kilo body weight. If repeated the body attains a resistance against *Strepto* infections, while smaller doses inhibit the generalised growth of the Cocci. The method can be used indiscriminately in all septic conditions to disinfect the blood and tissues, provided it is applied before the invasion is too extensive or widespread. It is to be regarded as prophylactic rather than curative. It had been observed that mothers taking Mercury shortly before or during childbirth, did not suffer from puerperal infections even though the conditions were most unhygienic, also that syphilitics undergoing mercurial treatment do not catch the ordinary infective diseases.—B.M J.E. ii./13,79.

FR. CX. gives mode of preparation, employing Yellow Mercuric Oxide, Acetic Acid (glacial), and Sodium Benzoate.

Hydrargyri Bromidum, MERCURIC BROMIDE. $HgBr_2$=360·44.
Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**). Silvery Scales. ***Soluble*** to the extent of 1 in 250 water; decomposes on boiling.

In syphilis in solution with Sodium Bromide thus,—Mercuric Bromide 1·8 Gm., Sodium Bromide 1·03 Gm., Water 100 Cc. is employed in dose of 1 to 2 Cc. of the solution (=0·01 to 0·02 Gm. Hg.) intramuscularly into the buttock. A platinum-iridium needle is essential. Some pain may be caused.

Hydrargyri Carbolas. Phenol Mercury.
$Hg.(C_6H_5O)_2.H_2O$ = 404·756.
Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) daily.

A whitish amorphous powder, obtained by double decomposition of mercuric chloride and an alcoholic solution of phenol in caustic potash

P1 **Hydrargyri Cyanidum, Cyanuretum Hydrargyri.** FR. CX.; P.G.V. **P. Belg.,** $Hg.(CN)_2$ = 252·63.
P1 *Applicable to Ireland.*
Dose.—$\frac{1}{20}$ to $\frac{1}{4}$ grain (**0·003 to 0·016 Gm.**). FR. CX. has *max. single dose* $\frac{1}{6}$ grain, max. during 24 hours $\frac{5}{8}$ grain approximately.

Is in anhydrous, white or colourless, prismatic crystals. ***Soluble*** 1 in 12 of water and 1 in 4 of glycerin. It is not decomposed by alkalis; it is used as a lotion to syphilitic sores, and given in pills of $\frac{1}{10}$ or $\frac{1}{12}$ grain twice daily. Used in diphtheria, $\frac{1}{250}$ grain frequently, with 1 minim Tincture of Aconite in honey, employing also a gargle, 1 in 10,000.

In syphilis 20 minims of 1% solution daily with caution. Has also been used intravenously. This dose given alternate days. It has been advised for persistent cerebral headaches of the secondary period.—L. ii./12,361.

P1 **Injectio Hydrargyri Cyanidi, Plaistow.** *Dose.*—2 to 10 minims. For subconjunctival use. 1 in 5,000 of water.

Subconjunctival injections of 20 minim doses of 1 in 4,000 solution will cure commencing senile cataract. Pain is very severe, lasting 3 or 4 hours. Patient should be under light chloroform anæsthesia.—Lieut.-Col. H. L. Smith, L. i./12,1056. See also B.M.J. i./06,262.

P1 **Solubes Hydrargyri Cyanidi et Boracis.**—Mercuric Cyanide 1 Gm., Borax 2 Gm., Potassium Chromate 0·075 Gm., Fluorescein 0·001 Gm. One to be dissolved in a litre of water to produce an antiseptic solution for obstetric work.—L. i./08,876.

P1 **Pasta Hydrargyri Cyanidi.** 1 in 500 in Tragacanth basis for smearing on catheters.

P1 **Hydrargyri Oxycyanidum,** $HgO.Hg(CN)_2$ = 469·23. P. Helv. White micro-crystalline powder ***soluble*** 1 in 17 cold water. Is employed in syphilis. Should not be used with Potassium Iodide. Sub-conjunctival injection.—B.M.J.E. ii./95,104.

In the treatment of syphilis during 1st week 0·05 Gm. in pill *pro die* as an average, to be taken when the stomach is full.—P.J. ii./09,426.

As a pigment 0·2 to 0·6% solutions have been employed, 1 in 10,000 strength to 1 in 5,000 as bladder irrigant and 1 to 2% for instruments, which it is said not to attack.

To prepare 1% solution extemporaneously.—Dissolve Mercuric Chloride 5·8 Mercuric Cyanide 5·4 Gm. in Water 800 about. Normal Potassium or Sodium Hydrate Solution 44·8 Gm. is then added and Water to 1,000 Gm. This contains also 0·25 % Sodium Chloride, or if Potassium Hydrate be used, 0·32 Potassium Chloride.—Apoth. Zeit. '08,23,793 ; *ex* P.J. ii./08,840.

P1 **Solubes** are prepared 0·2 Gm. each, one in 2 litres gives 1 in 10,000; 1 in 1 litre—1 in 5,000; 1 in 20 Cc.—1%; 1 in 10 Cc.—2%.

A solution in conjunction with Acoin was the subject of a patent.—P.J. i./07,472.

P1 **Mercury Oxycyanide Lotion Sterules** contain 8·75 grains. Each diluted to 1 pint makes 1 in 1,000 solution, to 1 quart makes 1 in 2,000 solution, 1 in 5 pints makes 1 in 5,000 Solution.

0·2 Gm. per litre (1 in 5,000) as a lotion for cleansing the glans and meatus prior to lavage in gonorrhœa.—Pr., Oct., '10, p. 417.

Iodides should be excluded from a patient so treated.

P1 **Mercuro-Zinc Cyanide.** LISTER'S ANTISEPTIC. A white powder usually supplied tinted with **Rosalane** (Mauveine Hydrochloride), obtained by precipitation from a cold saturated solution of the cyanide of mercury and potassium by adding a cold saturated solution of zinc sulphate in equi-molecular proportions, or by adding in similar solutions mercuric chloride to zinc and potassium cyanide. The maximum percentage of mercuric cyanide found is 38·5, and the body may be described as a trizincic monomercuric octacyanide—

$Zn_3\ Hg(CN)_8 = 604{\cdot}83$.

It decomposes somewhat in preparation, and is therefore of somewhat varying composition.—Dunstan, Proc. Chem. Soc., May 30,08. It should contain at least 20% Mercury Cyanide, $Hg(CN)_2$. If carefully made can be produced containing nearly 30%.

D. B. Dott says it is not reasonable to expect more than 25·28% Mercuric Cyanide as made by Lister's formula. Estimation process by reduction with hypophosphorous acid.—P.J. i./13,98; C.D., Jan. 25, '13.

A useful summary of the History of Antiseptics. Lister first used (undiluted) carbolic acid in an operation on August 12th, 1865. Many other antiseptics achieved temporary popularity. Lister tried the Mercurial Salts and in February 1886, the late William Martindale suggested to Lord Lister the powerful antiseptic Mercuric Cyanide. Lister subsequently tried Mercury and Potassium Cyanide, but this in common with others was irritating. Finally the late William Martindale suggested the double Cyanide of Mercury and Zinc which gave Lord Lister entire satisfaction.—"Chemicus," P.ii./15,325. See also B.M.J.'93, Feb. 18, and B.M.J. i./07,795.

Solubility.—Very slightly in water, more so in dilute acids.

Sterilisation.—It is unnecessary to sterilise Double Cyanide Dressings. We have conducted some experiments on this subject; decomposition may occur.

P1 **Mercuro-Zinc Cyanide Gauze** 3% is one of the most popular dressings for applying direct to wounds. It is not so irritant as some of the other mercurial dressings and has the advantage of keeping well without the mercurial salt becoming reduced by the cotton. It is supplied in 1, 2, 6 and 12 yard pieces and with **cotton wool tissue** in 1lb. packets Is damped before use with 1 in 20 Carbolic Acid solution. **Cotton Wool** as also bandages contain 3%.

For suppurating abrasions, boils and skin affections in war *Dry*

Cyanide Gauze covered completely with plaster excellent and rapid. No solution or other antiseptics used.—G. Home, B.M.J. i./16,14.

For visible clean wounds this is quite good. To be removed by Hydrogen Peroxide when too adherent.—Casualty Clearing Station experience.—A. Don. B.M.J. i./16,648.

[P1] **Mercuro-Zinc Cyanide Cream** may be made by triturating the powder with carbolic lotion, 1 in 20, *q.s.*, for applying to hairy parts adjacent to wounds.

[P1] **Mercuro-Zinc Cyanide Paste.** Mercuro-Zinc Cyanide 400, Tragacanth 2, Phenol 20, Water 800, mix. For a first dressing for wounds. *Caution: Not to be supplied in metal tubes—especially must not come in contact with lead as poisonous Lead Cyanide will be formed*—L. i./15,426. *To insure a thin surface which will immediately dry, the paste must be rubbed on in as thin a layer as possible.*

[P1] **Lotion of Mercuro-Zinc Cyanide** of strength 1 in 5,000 to 1in 1,000, is used for wounds. *Caution: Shake bottle—not dissolved.*

[P1] **Gargle of Mercuro-Zinc Cyanide**, 1 in 7,000, is employed for syphilitic sore throat. *Caution: As latter.*

[P1] **Unguentum Hydrargyri et Zinci Cyanidi, R.O.H.** 1 or 2 in 100 of Soft Paraffin (Silcock's Ointment), or Lanolin. For syphilitic sores and eczema, also excellent for burns and for granular eyelids. *Caution: Preferably not in collapsible tubes*, c.f. *above.*

Ⓟ**Hydrargyri Iodidum Rubrum.** **Mercury Biniodide, Mercuric Iodide,** Hg I_2=454·44.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**) Fr. Cx.: *Max. single dose* $\frac{1}{3}$ grain; max. during 24 hours $1\frac{1}{4}$ grains approximately.

Ⓟ**Pills** contain $\frac{1}{50}$, $\frac{1}{36}$, $\frac{1}{24}$, $\frac{1}{16}$, $\frac{1}{12}$, and $\frac{1}{8}$ grain.

Ⓟ**Tablets** contain $\frac{1}{20}$ grain (**0·003 Gm.**).

Red powder or crystals, ***soluble*** in solutions of other iodides, notably potassium iodide, and in solution of mercuric chloride, forming double salts *c.f.* Mercuric Potassium Iodide; also 1 in 25 of castor oil, or 100 parts of the latter will dissolve 8 of this iodide with 5 of perchloride of mercury, about 1 in 200 ether, in alcohol 1 in 300.

Uses.—Is a powerful antiseptic, not so irritant as Mercuric Chloride.

Ⓟ**Antiseptic Lotion** for the hands ..	1 in 4,000
Ⓟ**Collyrium**	1 ,, 5,000
Ⓟ**Wound Lotion**	1 ,, 7,000
Ⓟ**Vaginal Douche**	1 ,, 10,000

Ⓟ**Biniodide Spirit Lotion** 1 in 1,000.

For gonorrhœa dilute solutions are used, also as a pigment or spray for throat in scarlatina and diphtheria.

War Wounds. Acts like hypertonic Saline in producing free discharge and requires frequent changing. Not so painful as iodine. —Casualty Clearing Station criticism.—A. Don, B.M.J. i./16,648.

Ⓟ**Injectio Hydrargyri Biniodidi** (pro vagina), L.L.

Mercuric Chloride 8 grains, Potassium Iodide 5 grains, Water to 1 ounce. Diluted 1 drachm to a pint of water (1 in 10,000 approx.)

Tubercle of mucous membrane may be treated by causing a precipitation of Mercuric Iodide—*e.g.*, in bladder cases a teaspoonful of 5% Potassium Iodide a quarter of an hour before insufflation of calomel or its injection as oily emulsion.—B.M.J.E. i./09,84.

Ⓟ**Unguentum Hydrargyri Iodidi Rubri** (*Off.* and B.P. 1898). Strength 1 in 25.

For tinea may be applied to small spots, but not to large surfaces. Too strong for general use on the skin. Exophthalmic goitre has been treated by daily use of this ointment half strength.

Pernicious anæmia treated by inunction of the Ointment into the skin over the liver in conjunction with arsenic *per os*. The inunction of Red Iodide in this way is useful in many other chronic affections. In syphilis Arsenic added to Mercury yielded as good results as Salvarsan.—J. Craig, B.M.J. ii./13,108.

Ⓟ**Injectio Hydrargyri Iodidi Rubri Hypodermica (Ragazzoni).**

Dose.—2 to 6 minims (**0·12 to 0·4 Cc.**).

Mercuric Iodide 1 grain, Sodium Iodide *q.s.*, in 64 minims.

In syphilis can be used in large doses, but is painful.

Ⓟ**Sterules, Hypodermic,** contain $\frac{1}{12}$ grain in 8 minims for a dose.

Ⓟ**Hydriodol, Mercuric Iodide Oil.**—*Syn.* **Cypridol.**

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**).

Contains 1% of the Iodide in sterilised oil, for hypodermic injection.

Detachment of the retina has been treated by 0·4% solution in sterile oil. An injection daily into the lumbar region after cleansing the skin with ether. Suspension during 20 days after 10 of treatment.

Ⓟ**Hydriodol Capsules** contain of the Oil = $\frac{1}{32}$ and $\frac{1}{16}$ grain of Mercuric Iodide, and given *per os* are slowly absorbed by the biliary and pancreatic secretions,—not irritating to the digestive organs.

Ⓟ **Collapsible Tubes** of Mercuric Iodide Ointment 1% with catheter attachment are useful for the treatment of gonorrhœa.

ⓅOLEUM HYDRARGYRI BINIODIDI. *Syn.*—HUILE D'IODURE MERCURIQUE. FR. CX.

Dose.—15 minims (**1 Cc.**) containing approx. $\frac{1}{16}$ gr. (**0·004 Gm.**)

Mercuric Iodide 4, Olive Oil purified and sterilised 920 by weight.

Dissolve at not exceeding 60° C.

P1 **Pilula Arsenii et Hydrargyri Iodidi.**

Dose.—1 or 2, two or three times a day.

Arsenious Iodide, Mercuric Iodide, of each 1 grain, Distilled Water *q.s.* to dissolve, Sugar *q.s.* to make 12 two-grain pills (or **1 Gm.** of each Iodide in 180 pills). May be combined with 2 grains of Iodide of Iron.

Ⓟ**Wool, Mercuric Iodide.** $\frac{1}{4}$%.

Impregnate Absorbent Wool 400 under pressure with a Solution of Mercuric Iodide 1 and Potassium Iodide 1, and spread out to dry.

Ⓟ Hydrargyri et Potassii Iodidum.

$HgI_2KI, 1\frac{1}{2} H_2O = 647{\cdot}484$.

Mercuric Potassium Iodide, commonly known as '*Biniodide*' when referring to Antiseptic Lotions,—made with the double salt. '*Biniodide' is, however, a common synonym for Mercuric Iodide.*

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004** to **0·016 Gm.**) in pill.

Antidotes.—Olive Oil, Milk, White of Egg, Petroleum Emulsion, warm draughts to encourage vomiting,—later Bismuth and Morphine.—*c f.*, B.M.J.ii./07,1775; i./08,20.

Manufacture. From a hot saturated solution of Mercuric Iodide in Potassium Iodide: on cooling pure Mercuric Iodide first separates; Mercuric Potassium Iodide $HgI_2KI.1\frac{1}{2}H_2O$ then separates in yellow prisms. Naylor, P.J.i./08,315, uses this method by dissolving Mercuric Iodide 45, Potassium Iodide $16\frac{1}{2}$ (*i.e.*, approximately equimolecular proportions) in water 30, boiling the mixture for a few minutes, allowing to cool for pure Mercuric Iodide to crystallise out, filtering and concentrating the filtrate. Collect the first crop of crystals, rejecting later portions which contain excess of Potassium Iodide. Another method is to use Alcohol 90% 20 instead of the water above mentioned, boil the salts with the Alcohol until almost entirely dissolved and crystallise.

Solubility.—This Salt is not soluble in water except in presence of Potassium Iodide, *i.e.*, sufficient at least to produce the body HgI_22KI; in other words, the theoretical amount (170 approximately) of Potassium Iodide must be added to 647 (approximately) of the double Salt,—this can be easily shown by experiment, but even an excess of this quantity is desirable in tablet making.

Brought into contact with water, 2 $(HgI_2KI.1\frac{1}{2} H_2O)$ decompose into $HgI_22KI = 785{\cdot}88$ and HgI_2 (+Aq.). It is, therefore, impossible to prepare soluble Antiseptic Tablets of this substance alone.

The body HgI_22KI is also formed in solution, when three times the weight of Potassium Iodide as of Mercuric Chloride are dispensed altogether,—theoretically the proportion is 2·45 to 1, thus:—

$$HgCl_2 + 4KI = HgI_2{,}2KI + 2KCl$$

and this will produce the desired antiseptic effect providing the Potassium Iodide be pure. It makes no difference whether the Potassium Iodide is added to the Mercuric Chloride or *vice versa.*—P.J. ii./06,533,557.

Soluble also in Alcohol 90% 1 in 1 (without decomposition), 1 in 1 in Ether, and about 1 in 2 Glacial Acetic Acid.

For Ⓟ **Nessler's Solution** *v. Vol. II.*

Ⓟ Mistura Hydrargyri Biniodidi, K.C.H.

Dose.—1 ounce (**30 Cc.**).

Solution of Mercuric Chloride 30 minims, Potassium Iodide 10 grains, Ammonium Carbonate 5 grains, Decoction of Cinchona (B.P. '85) to one ounce.

Ⓟ **U.C.H.** has Solution of Mercuric Chloride 60 minims, Potassium Iodide 4 grains, Water to one ounce. Ⓟ **St. M.'s H.** is identical in strength in Mercuric Chloride. Ⓟ L.H. is double the strength.

Uses.—Given for syphilis. In lupus erythematosus, 1 in 1000 solution on gauze covered with protective (at night) acts like a charm. May have to be continued for months.—B.M.J. i./06,120.

In syphilis the mercury in one of the above mixtures is more rapidly eliminated than when mercury is given alone. The potassium iodide acts as a diuretic. This mode of administering mercury would therefore not readily commend itself.—G. Pernet. B.M.J. i./07,730.

For comparison of the relative value of mercury and arsenobenzol *vide* p. 201 also 'Salvarsan' by M. and W. Many authorities now advise a combined treatment.

Keloid well treated by **Mistura Hydrargyri Biniodidi.** The arms of the patient (who had contracted syphilis seventeen years previously) became ulcerated sixteen years afterwards, and subsequently the keloid developed, especially at margins of the scar and bends of the elbows, which could not be extended beyond a right angle. The treatment with Biniodide Mixture in a short time enabled patient to extend the arms to a much greater degree.—P R.S.M., Nov./10, Derm. Sect., p. 3.

Ⓟ **Pilula Hydrargyri Iodidi Rubri** ($\frac{1}{8}$ grain) **et Potassii Iodidi** (4 grains). *Dose.*—1 twice daily.

Ⓟ**Soaps** containing respectively 3, 1 and $\frac{1}{2}$% of Mercuric Iodide are prepared. Useful for eczema, acne, scabies, ringworm and desquamation after fevers.

Ⓟ**Unguentum Hydrargyri et Potassii Iodidi.**

Mercuric Iodide 1, Potassium Iodide 1, Water 13, Lard 35, Hydrous Wool Fat 50. B. S. H. has 5 grains each of the salts, Water *q.s.*, Lard 1 ounce.

P1 ∗ **'Solubes' Biniodide.**

Contain the equivalent of Mercuric Potassium Iodide 8·75 grains. One in 1 pint of water forms a solution of the strength of 1 in 1,000—suitable for wounds. For lotions and instruments this may be diluted with from 1 to 3 or more parts of water.

When asepsis in surgical operation doubtful, 1 in 2,000 Biniodide in Spirit should always be used.—B.M.J. i./09,1170.

P1 **Biniodide Lotion 'Sterules'** contain 8·75 grains. One diluted to $\frac{1}{2}$ pint gives 1 in 500 Solution or to 1 pint gives a 1 in 1,000 solution.

Surgery of the peritoneum.—A report based on information from 70 representative teachers and surgeons. Antiseptics used—Mercuric Iodide in Spirit 1 in 500 to 1 in 2,000, Perchloride 1 in 500 to 1 in 2,000, Iodine, Lysol, Lysoform, various strengths, and others. —H. MacNaughton Jones, L. ii./12,1060.

Hydrargyri Iodidum Flavum. Yellow Mercurous Iodide. $Hg_2 I_2 = 655{\cdot}04$ (HgI. U.S.).

Prepared by double composition between freshly made Mercurous Nitrate and Potassium Iodide. (Must not be confounded with the yellow variety of Mercuric Iodide). *Dose.*—$\frac{1}{8}$ grain (0·008 Gm.).

Pills and Tablets contain $\frac{1}{8}$ grain. Employed in syphilis.

Hydragyri Iodidum Viride. Green Mercurous Iodide, Mercury Protoiodide.

Dose.—$\frac{1}{6}$ to 1 grain (0·01 to 0·06 Gm.) gradually increased to 3 grains. **Pills** contain $\frac{1}{6}$ and $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain, and **Tablets** contain $\frac{1}{8}$ grain,—with opium and pepper to prevent looseness of bowels. *Incompatible* with other iodides

This salt should be kept from the light, be of yellowish-green colour, and contain slight excess of mercury; otherwise, as the late W.M. showed, it is unstable and dangerous.—P.J. 1890,259; B.M.J. ii./90,642. Mercury Protoiodide *versus* '606.'—L.i./11,1314.

Hydrargyri Lactas, Mercurous Lactate.

$Hg_2(CH_3.CH.OH.COO)_2 = 579{\cdot}31$.

Dose.—Hypodermically $\frac{1}{8}$ grain (**0·008 Gm.**) in 15 minims (**1 Cc.**) of water per diem, *per os* $\frac{1}{5}$ grain (**0·012 Gm.**) well diluted.

A crystalline compound, containing about 65% of mercury, ***soluble*** in water, insoluble in alcohol 90%.

May be produced by mixing boiling concentrated solutions of Mercurous Nitrate and Sodium Lactate—the salt throws out with $2H_2O$ in pink rosettes.

Can also be made (white, the more usual form) by dissolving freshly precipitated Mercurous Oxide 416 in excess of Lactic Acid with Water *q.s* and evaporating.

As an antisyphilitic on account of its safety and solubility. It is stated to be irritating in use in trypanosomiasis.—L. i./08,114.

Hydrargyri Nitras, Mercurous Nitrate.

$Hg_2(NO_3)_2.2H_2O = 561{\cdot}252$.

In colourless monoclinic crystals, generally either damp (from adhering acid) and ***soluble*** in water, or yellow tinted (from basic salt), then not perfectly soluble in water. Used in syphilitic sores, 1 in 30 or more, as a lotion or ointment, and occasionally internally in same dose as mercuric chloride.

Liquor Hydrargyri Nitratis Acidus. (*Off.* and B.P. 1898).

Used as a caustic for syphilitic warts, and lupus.

Urethral injection 1 in 1,000, or more, in gonorrhœa and for syphilitic sore throat as gargle.

The Fr. Cx. dissolves Mercury 100, in Nitric Acid (Fr. Cx.) 165 and Water 35, mixed, with slight heat, and evaporates to 225 (all by weight). Sp. Gr. 2·246.

Unguentum Hydrargyri Nitratis. (*Off.* and B.P. 1898).

Syn. CITRINE OINTMENT. MERCURIC NITRATE OINTMENT.

Contains about 1 of Mercury in 15 of the finished Ointment.

The Mercury Solution, by the official process, consists principally of mercurous nitrate before it is added to the fats. There being also an excess of acid present, the chemical action is thus intensified, and by the time the process is completed, by constant and vigorous agitation, all further chemical action will cease, and the ointment should keep of a good colour for months without generating more gases and thus becoming spongy. Its preparation requires care, skill, and attention. Now the method of procedure is slightly altered.

For further details vide Vol. II.

Aurinarium Unguenti Hydrargyri Nitratis contains $\frac{1}{3}$ grain of the official ointment—useful for chronic eczema of the meatus.

Unguentum Hydrargyri Nitratis Dilutum (*Off.*).

Contains 20% of Citrine Ointment.

Found to separate at summer temperature. Mercuric Nitrate Ointment 1, Hydrous Wool Fat 1, Yellow Soft Paraffin 3; Melt the two latter with gentle heat, remove from flame and add the first and stir while cooling. Keeps well. —C D. i./10,57.

R.O.H. has 10% in Soft Paraffin.

In tinea tarsi of great value, employed with a brush to the eyelids, also in chronic eczema, psoriasis, and herpes preputialis.

In pustular eczema after removing crusts this checks further infection, then employ Lassar's paste and soothing lotions.—B.M.J i./09,1342.

Unguentum Acidi Carbolici Compositum. V.H.C.

Mercuric Nitrate Ointment 2, Sublimed Sulphur ½, Phenol 1, Olive Oil 1, Yellow Wax 1. L. H. has Mercuric Nitrate Ointment 2, Carbolic Acid 1, Sulphur Ointment 2

Unguentum Metallorum.

C.X.—Mercuric Nitrate Ointment, Lead Subacetate Ointment and Zinc Ointment of each equal parts.—**G.H.** is similar.

Mid. H.—same as C.X. except Dilute Mercuric Nitrate Ointment in place of Mercuric Nitrate Ointment.

Gt. Northern and King's as C.X.—except Lead Acetate Ointment in place of Subacetate Ointment.

Guttæ Hydrargyri Nitratis, L.H. (*Aural*). Diluted Mercuric Nitrate Ointment 1 drachm, Olive Oil ½ ounce, Liquid Paraffin to 1 ounce. **Aurinaria** are prepared *q.v. antea.*

Nebula Hydrargyri Nitratis, T.H.—Nitrate of Mercury Ointment 20, Soft Paraffin 20, Olive Oil 120, Liquid Paraffin 120.

Ⓟ**Hydrargyri Peptonas.** Mercury Peptonate.

Dose per os.—½ to 1½ grains (**0·03 to 0·1 Gm.**), hypod. ⅙ grain.

Brown powder containing 10% Mercuric Chloride, soluble in water.

Ⓟ**Hypodermic Sterules** are prepared containing 15 minims of 1% solution=⅙ grain (**0·01 Gm.**) approx. in each. For injection in syphilis. Fr. Cx. gives method of manufacture of the Solution.

[P 1] **Hydrargyri Perchloridum.** **Mercuric Chloride, Hydrargyri Chloridum Corrosivum, U.S.**; Corrosive Sublimate, $HgCl_2$=271·52.

Dose. $\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**). *Off.*, but in treatment it may be increased to ¼ grain.

Fr. Cx.: *Max. single dose* ⅓ grain. Max. during 24 hours 1 grain approximately.

In heavy colourless crystalline lumps or white powder.

Antidotes. Emetics, Apomorphine, white of 1 egg for every 4 grains of perchloride, *vide* also Poisons and Antidotes at end of book. Mercurial poisoning from surgical use of sublimate especially when left in wounds and cavities should be treated by diuretics. Stimulants for collapse and potassium chlorate for stomatitis.—L.i./09,562.

Mercury line on *gums.* Distinguish from lead line, *c.f.*, Plumbum; also *infra* (industrial poisoning).

44 grains of Mercuric Chloride in the form of soluble Tablets taken after a full meal,—death followed seven days after. Treatment, lavage of the stomach, antidotes, stimulants and attempts to assist elimination.–L. ii./11,297.

Recovery after 8¾ grains taken by a man of 85. White of egg and water administered, stomach tube passed. Washed out stomach with large quantities of albumen water and milk and water. Strychnine hypodermically and milk and brandy *per os*, hot blankets and bottles. All the while bowels very irritable. During convalescence Cremor Magnesiæ and brandy in milk. Ultimate recovery.—B.M.J. i./13,116.

Poisoning by 2½ grains accidentally contained in a headache powder. Treated by Olive Oil, Magnesia and emetics. Lived 21 days.—B.M.J. i./05,767.

Recovery after 43½ grains, Carron Oil made with Cod Liver Oil given.—L. ii./06,653.

Industrial Mercurial poisoning (preventive measures and treatment when set in). Potassium Bromide and Tincture of Digitalis with Solution of Strychnine recommended.—L. ii./05,823.

Industrial poisoning with Mercury in felt hat makers. The line on the gums in this case appears as a cyanosed edge to the gum—which might be mistaken for the blue lead line. It is purplish blue, not a lead blue.—F. E. Tylecote, L. ii./12,1138.

Mercurial poisoning by inserting 7·3 grain Perchloride tablets into the vagina instead of use as douche—in America.—B.M.J. ii./11,938. See also B.M.J. ii./16,453, a death under the same conditions.

Soluble 1 in 18 Water at 60° F., 1 in 4 of Alcohol 90% at 60° F., 1 in 4·35 Ether (0·720) at 58·5° F.—P.J. ii./03,881, and about 2 in 3 of Glycerin.

The slight acid reaction of an aqueous Mercuric Chloride Solution disappears on addition of Sodium Chloride, Ammonium Chloride and other Metallic Chlorides. The neutral double salts formed are, *e.g.* :—

$HgCl_2 + NaCl + 1\frac{1}{2}\,H_2O$; $HgCl_2 + 2NaCl$.
$HgCl_2 + NH_4Cl$; $HgCl_2 + 2NH_4Cl + H_2O$.
$HgCl_2 + KCl + H_2O$; $HgCl_2 + 2KCl + H_2O$; $2HgCl_2 + KCl + 2H_2O$.

These are *more soluble in* water than Mercuric Chloride.

Solutions of these double salts contain fewer Mercuric ions and are hence *less poisonous* (taking same weights of Mercury) than solutions of Sublimate.—Schmidt.

In some experiments which we conducted (*January*, 1912), *it was found that the formation of the double salts in question has no marked effect on the antiseptic power of Sublimate.*

(*C.f.* Data under **Uses**, also Chapter on 'Antiseptic Powers,' *Vol. II.*

It may be of interest to add that the late Lord Lister tried one of the Potash Compounds in his earlier work.

The official preparations are Ⓟ**Lotio Hydrargyri Flava** (0·46 to 100, or 2 grains to 1 ounce Solution of Lime), and Ⓟ**Liquor Hydrargyri Perchloridi** [now 1 in 1,000, ($\frac{1}{18}$ grain in 1 drachm approx.) was 1 in 875 ; *dose*, ½ to 1 dr.]*

Incompatibles.—It precipitates most alkaloids from solutions, and should therefore not be ordered with them : the alkalis and the salts of silver and lead are attacked also. Steel surgical instruments should not be dipped in this solution. It forms insoluble compounds with albuminous fluids (*v. infra*), also incompatible with bodies containing tannin, soap, iodine and potassium iodide.

Uses.—The most powerful antiseptic. 1 in 1,000 solution kills anthrax spores in 15 minutes, the bacilli themselves being killed by 1 in 15,000 in 1 minute. The growth of the bacilli in question is

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Ⓟ***Van Swieten's Solution,** Fr. Cx. 0·1% by weight in water. Max. single dose 20 Gm. Max. during 24 hours 60 Gm. Five of hydrochloric or tartaric acid added to 1 of sublimate is said to prevent the precipitation of insoluble albuminate of mercury and thus to increase and render its antiseptic power continuous.

prevented by 1 in 500,000 strength.—Hale White. Its solution does not pass through animal membrane rapidly, *vide* Antiseptics, *Vol. II.*

Aqueous solutions 1 in 1,000 and more diluted, also Glycerin Solutions are much used as surgical dressings.

In syphilis, given in small doses *e.g.*, $\frac{1}{16}$ grain *t.d.*, has an antiseptic intestinal action and is employed in some forms of diarrhœa of infancy.

To prevent syphilitic infection energetic washing with Perchloride 1 in 2,000 is advised, or the following:—

Mercuric Chloride 0·25, Sodium Chloride 0·5, Water 2, Absolute Alcohol 0·5, Glycerin 100, or instead of the Glycerin 100, Paraffin Ointment 80 with Glycerin 20 to be used.—B.M.J. ii./08,1087.

Syphilis. The principles of Mercurial treatment.—D'Arcy Power, B.M.J. ii./12,1603.

For eye lotions 1 in 4,500 parts of water, and for lotions for the nose and mouth and for vaginal leucorrhœa the same strength is suitable. R.O.H. gives $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{16}$, or $\frac{1}{20}$ grain per ounce of water for eye lotion.

500 births during which the parturient women were irrigated with 1 litre of 1 in 1,000 Sublimate Lotion compared with 500 in which there was no vaginal disinfection; 12·8% of the former had fever, whilst only 8% of the undisinfected had it. Deducting those who had fever not originating from the genitalia there remained 5·2% with fever, among the non-disinfected, and 10% among the disinfected. Analogous results by disinfection with Lactic Acid. These results, opposed as they are to fundamental views of antisepsis, are explained by assumption that the hand used in examining is the principal source of infection. Recommendation to employ gloves (specially thin). B.M.J. ii./10,1222.

For gonorrhœa and gleet a lotion 1 in 4,000 to 1 in 2,000 is recommended.

For ear discharges, syringing with 1 in 10,000 is antiseptic.

Chorea has been treated by, with success.—Pres., Jan. 1911, pp. 2, 10, also in paresis, puerperal infection and varicose veins.

In operating on cataract 576 cases low percentage of eyes lost by suppuration was due to use of 1 in 2,000 perchloride douche in conjunction with 4% cocaine solution.—L. ii./09,1129.

In stomatitis if the surface epithelium is shed the mucous membrane may be brushed with 1 in 5,000 solution Sublimate.—Yeo.

Prickly heat well treated by rubbing in a lotion of 1 in 1,000 water containing Hydrochloric Acid (strong) 2. Allow to dry on. If skin tender, wash off again after a few minutes. Usually cures in a couple of days. Repeat if necessary.—E. H. Hankin, I. Med. Gaz. *per* Pres. Oct. 1913,280.

*For further references to the use of Mercuric Chloride, v.*p. 466.

Ⓟ**Glycerinum Hydrargyri Perchloridi,** U.C.H., is 0·1%. L.H. the same strength, *viz.*, Mercuric Chloride 17½ grains, Distilled Water 6 drachms. Glycerin to 2 pints, tinted blue with *Liquor Cœruleus*, which contains Turquoise Blue 4 grains in Distilled Water 1 ounce. Distinguish from the following:

Ⓟ**Glycerinum Hydrargyri Perchloridi Alcoholicum,** U.C.H.—Mercuric Chloride 35, Glycerin 50, Methyl Blue 0·05, Methylated Spirit to 100. *For disinfecting Urine* **Caution.**—Not for administration.

Ⓟ**Lint, Absorbent Wool, Gauze, or Wood Wool,** *q.v.*, may be impregnated with ½% of each, corrosive sublimate and glycerin.

Ⓟ**Mistura Hydrargyri Perchloridi, E.L.**—Solution of Mercuric Chloride 10 minims, Water to 1 drachm.

Ⓟ**Mistura Hydrargyri Perchloridi Composita.**

Dose.—½ ounce (15 Cc.) in a little water in syphilis thrice daily 30 minutes after food, for adult males.—(*Caution.*=¼ grain Sublimate per dose); females half the dose.

Mercuric Chloride 4 grains, Potassium Chlorate 1½ drachms, Ammonium Chloride 3½ drachms, Compound Tincture of Cardamoms 1 drachm, Simple Syrup 1 ounce, Water to 8 ounces. The Perchloride (= ¼ grain per dose) is tolerated by the addition of the other salts. In syphilis the dosage, as stated, has given valuable results.—J. Bain, B.M.J. ii./12,496.

Ⓟ **Gargarisma Hydrargyri Perchloridi,** (1 in 1,800). Mercuric Chloride ¼ grain, Hydrochloric Acid 1 minim, Glycerin 30 minims, Water to 1 ounce.

R.O.H. has 1 in 4,000 without added Acid.

For influenza, sore throat, especially quinsy, Solution of Mercuric Chloride 1, Acid Infusion of Rose Petals 1. One tablespoonful in a teacup of hot water as a gargle.—C.D. i./08,85.

Ⓟ**Lotio Hydrargyri Acetica.**

Mercuric Chloride 1, Acetic Acid 75, Glycerin 75, Alcohol (90%) 250, Rose Water 500. To destroy pediculi and detach their ova.

Ⓟ**Lotio Hydrargyri Perchloridi, U.C.H.,** Mercuric Chloride 0·2% coloured with methylene blue.

Ⓟ**Lotio Hydrargyri cum Acido Carbolico, E.L.**—For pediculi. Solution of Mercuric Chloride 1, Dilute Acetic Acid 2, Turpentine Oil 6, Phenol Solution (1 in 40) to 24.

Ⓟ**Lotio Parasiticida, St. M.'s H.**

Mercuric Chloride ¼ grain, Acetic Acid 2 drachms, Water to 1 ounce.

Ⓟ**Pigmentum contra Tineam.**

Mercuric Chloride 1, Salicylic Acid 9, Phenol 10, Glycerin 80. Efficient in ringworm

Lotion for alopecia syphilitica,—Mercuric Chloride 3 grains, Acetic Acid 5 minims, Alcohol 90% 8 ounces. Apply with a toothbrush night and morning. Use also Pomade each evening.—Calomel 15 to 30 grains, Salicylic Acid 8 grains, Vaselin 1 ounce.—B.M.J. ii./10,180.

Ⓟ**Mackenzie's Eye Wash.**

Sublimate 1, Ammonium Chloride 6, Belladonna Extract 10, Coccus Cacti 1½, Proof Spirit 55; rub together and add Water to 330. Mix with equal parts of boiling water to bathe the eyes.—I.M.G., Nov. 1907,409. *Caution.—This will be about five times as strong as usually employed in eye work.*

Ⓟ**Pills** contain $\frac{1}{40}$, $\frac{1}{32}$, $\frac{1}{20}$, $\frac{1}{16}$, and $\frac{1}{12}$ grain.

P1 **Pilules de Chlorure Mercurique Opiacées. Dupuytren's Pills.**—Fr. Cx.

Mercuric Chloride 1, Opium Extract 2, Extract of Agropyrum 2

(Extrait chiendent), Licorice Powder *q.s.* Each pill contains Mercuric Chloride 0·01 Gm. and Opium Extract 0·02 Gm.

Ⓟ**Ophthalmic discs** contain $\frac{1}{100,000}$ grain of Sublimate.

Ⓟ**Sublimate Disinfectant.**—*Local Government Board.*—L. ii./92, 682; B.M.J. ii./93,18.

Sublimate ½ ounce, Hydrochloric Acid 1 ounce, Soluble Aniline Blue 5 grains, Water 3 gallons.

Ⓟ**Charta Hydrargyri Bichlorati.** FR. CX. PAPIER AU SUBLIMÉ CORROSIF.

Filter paper washed in very dilute hydrochloric acid, then in distilled water dried, cut into pieces 10 × 5 Cm., and soaked each in 1 Cc. of a solution of Mercuric Chloride 1, Sodium Chloride 1, Water to 4, and dried. Each sheet will contain 0·25 Gm. of Mercuric Chloride suitable for dissolving in a litre of water, making a 1 in 4,000 solution.

Ⓟ**Perchloride** ✱**'Solubes'** are made of three sizes, combined with sodium chloride, and coloured blue. They are convenient for surgical purposes, the *largest* containing 17½ grains, making 20 ounces, 1 in 500; the *next smaller* containing 8·75 grains, for 20 ounces of lotion, 1 in 1,000. These may be further diluted with from one to three or more parts of warm water. See strengths of solutions for use, *infra.* The *smallest* (½ grain) produce a solution of 1 in 4,500 when dissolved in a tumbler of warm water, suitable for ophthalmic work.

Ⓟ**Perchloride Lotion Sterules** contain 8·75 grains. Each diluted to 1 pint with Water makes a pint of 1 in 1,000 solution.

✱**'Solubes'** (T.M. 254730) signify material for preparation of solutions of definite strength for external or local use. For complete Series consult Index. **Strengths of Solutions for use :—**

Solutions 1 in 10,000 to 1 in 1,000 may be used for infected linen, the walls and floors of infected rooms, the hands of surgeons and gynæcologists, and as a lotion to superficial wounds. For continuous applications 1 in 10,000 forms an active lotion, but 1 in 500 is the minimum strength (with acid added) for use to disinfect excreta. *c.f.* Sublimate Disinfectant above.

There is risk of poisonous effects from vaginal injections of 1 in 1,000; watch for the occurrence of diarrhœa.

Sir W. Watson Cheyne's Lecture on the **Treatment of Wounds.** 1 in 2,000 solution useful for the hands and to rinse away blood from wounds—not necessarily for deluging the wounds themselves. —L. ii./08,1797. See also B.M.J. Nov. 21/14.

P1 **"Hydrion" Tablets** contain Mercuric Chloride 4·375 grains, Calcium Chloride 1·86 grains, Sodium Chloride 34·76 grains, Potassium Chloride 0·075 grains, one of which dissolved in a pint of cold water makes an antiseptic solution used with good effect for recent wounds on the hands, feet, head and exposed parts generally. Suggested also for battlefield wounds. The solution is used somewhat weaker on delicate skins, and much stronger in the first immersion of a very dirty wound. The tablets are very hygroscopic and must be kept dry.—Thomas Lissaman, L. ii./14,1438

ⓅPastilli Hydrargyri Bichlorati P.G.V. contain 50% with Sodium Chloride and are coloured with a red coal tar dye. They are cylinder shaped and weigh either 1 or 2 Gm., are twice as long as they are thick, and each is wrapped in black paper on which is stated in white "Poison" and the weight of sublimate in Gm. in same.

Ⓟ Sublimate—Spirit.

Alcoholic Solution of Mercuric Chloride 1 in 1,000 of 70% Alcohol was superior in bactericidal power to Tincture of Iodine, and far superior, cultural experiments showed, to an Aqueous Solution of Sublimate.—B.M.J. ii./11,1078; L. ii./11,442.

Skin Sterilisation.—Mercuric Chloride 1 in 500 in S.V.M. is efficient. More powerful than Iodine, which painted on the scrotum, anus or vulva causes inflammation. This Solution does not, neither does it stain.—C. Clarke, B.M.J. ii./12,764.

Ⓟ **C.H.W.** has **Injectio** 1 in 4,000 and **Injectio Fortior** 1 in 2,000.

Vaginal douching with Perchloride 1 in 5,000 combined with administration of Aspirin lowered temperature after labour. The Perchloride was more effective than a warm Potassium Permanganate solution.—B.M.J. i./11,251

In gonococcal arthritis in women vaginal douching twice daily with solution 1 in 1,000 and 1 in 2,000 is of use.—B.M.J. ii./11,1466.

Ⓟ **Tablets,** $\frac{1}{100}$, $\frac{1}{32}$, $\frac{1}{16}$ and $\frac{1}{10}$ grain are for internal administration.

Ⓟ **Hypodermic Tablets,** $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$ grain.

Ⓟ **Wool, Perchloride** ('**Sublimate**') 2% 1 lb. rolls.

To prepare, impregnate Absorbent Cotton 100 with 200 of a solution of 'perchloride' 4 and glycerin 2, press to 200 and dry it spread out. Weaker strengths can be prepared on the same lines with less perchloride.

Ⓟ **P. Jap** uses Mercuric Chloride 2, Potassium Chloride 2, Water 1,500, Wool 1,000, *i.e.*, 0·2%.

Sublimate-Malachite Green Solution.

A useful non irritant solution.—*See* **Malachite Green.**

Tinea destroyed by solution of 3 grains in an ounce of spirit of nitrous ether.—B.M.J. i./85,434.

Anthrax successfully treated by Hypodermic injection of 1 in 1,000 solution.—B.M.J. ii./90,16; L. ii./91,658.

Lupus, in initial stage, subcutaneous injection of 1% solution into affected tissue successful.—L. ii./95,965.

Leprosy relieved. Weekly injections subcutaneously.—L. ii./96,364.

Empyema, three tappings and two injections of ¼ grain Perchloride in 2½ ounces of water with improvement.—B.M.J. i./03,78.

Nævi treated by 6% Perchloride in Collodion.—B.M.J.E. ii./03,96.

Glossitis treated by a mouth-wash of Mercuric Chloride 2 grains, Hydrochloric Acid 8 minims, Glycerin ½ ounce, Water to 8 ounces.—B.M.J. i./11,536.

For dressing of fistulæ, Wool soaked in 1 in 2,000 Solution of Sublimate is best.—B.M.J. i./11,1048.

Bilharziosis (endemic hæmaturia).—Associated with this disease is almost invariably the appearance of blood and pus in the urine. Mercuric Chloride intravenously is given with good results, the solution consisting of 1 mgr. of Perchloride in 5 minims of normal saline solution.—B.M.J. i./09,773. *Bilharzia* ova in Mummies' kidneys.—B.M.J. i./10,16. The internal administration of the Liquid Extract of Male Fern 1 Gm. *t.d.*, "often acts like a charm" in controlling hæmorrhage.—Brooke. In the Zambesi district, the **Wortabel Treatment** with spirit of turpentine with thymol added.—L. ii./07, 923. Avoid bathing too long in infected rivers and ponds. This is frequently a direct cause, the parasite entering through the urethra or anus. The parasite, it is believed, is unable to reproduce itself fully in the human body.—L. ii./10,375,576. Blood changes in Bilharziosis.—Slight general leucocytosis roughly proportional to the intensity of the disease. Secondary anæmia is present in moderate degree in most cases. Even when the red corpuscles show no reduction in numbers there is loss of hæmoglobin (Kautsky). Bilharziosis is responsible in Egypt for most cases of moderate anæmia in children.—L. ii./11,1328. Bilharziosis and malignant disease of the bladder.—Jl. Path. and Bact., July, 1911, p. 76.

Good results from **Thymo-benzene** (2 grains of Thymol in ½ drachm Benzene). Ova passed in shoals on the third day. The urine soon loses all colour of blood. Mild cases in robust subjects lose all trace of infection in a few weeks ; —W. Robertson, L. i./16,698.

The intermediate host of the worm is a fresh-water mollusc. The two main species in Egypt have distinct intermediate hosts. Effective means found for rendering infected waters safe in military camps.—B.M.J. i./17,832.

Antimony Potassium Tartrate Injections (*q.v.*) have been most successful.

Acute myelitis (so called) may in some cases be meningeal in origin and may be cured by laminectomy and free drainage of the subdural space—no risk in washing out the theca with Perchloride Solution as strong as 1 in 500 followed by 1 in 2,000 solution some of which to be left in the wound when closing up.—B.M.J. i./09,513.

Typhoid treated by intravenous injection of perchloride. Dose employed was 0·01 Gm., but 0·02 Gm. has been used in syphilis.—B.M.J.E. i./09,28.

Primary syphilis has been treated by Iontophoresis of a 2% solution. *Vide* **Iontophoresis**.

In syphilis some uncommon methods of giving Mercury. *Inhalation* from a mask or 'Merkalator' containing 8 mgr. of Mercury. *Intravenously* (*c.f.*, Mercuric Cyanide), *Respiratory means* and *Fumigation*. In the latter 15 to 20 grains are vaporised under the patient's chair,—he does not inhale it. **Balneum Hydrargyri Perchloridi.** —*Baths.*—Mercuric Chloride and Dilute Hydrochloric Acid of each 1 drachm, Water 30 gallons, or Mercuric Iodide 1 drachm, Sodium Chloride 2 drachms, Water 30 gallons. *Not* well spoken of. Bath must be made of wood.—L. ii./12,361.

Malignant pustule well treated by use of sublimate as dusting powder without incision or excision. An opening a little larger than the pustule is cut in the centre of a piece of plaster, and this is applied so that the pustule appears through the hole. Sublimate is then applied to the pustule so as to cover it entirely, and the opening is covered with another piece of plaster. After 24 hours the dressing is removed. The eschar formed detaches itself in about ten days. Insterstate Med. Jl., April 15, per Pres.

Mercurialised Serum. C.M. Byrnes of Johns Hopkins University found this preferable to Salvarsanised Serum. Albuminate of Mercury is used. It is precipitated from Mercuric Chloride and redissolved in excess, thus:—

Blood is withdrawn *q.s.*, to yield 12 to 30 Cc. of Serum. 1 Cc. of water containing Mercuric Chloride 0·0013 Gm. (1/50 grain) is added to 12 Cc. of Serum. Salt solution is added *q.s.* to 30 Cc. or the Serum is used concentrated as such. Heat to 56° C. for ½ hour. Lumbar puncture is performed and spinal fluid withdrawn until pressure falls to 30 mm. and the Mercurialised Serum given by gravitation at body temperature. Serum corresponding to even 1/25 grain Mercuric Chloride can be safely given.

Loyd Thompson : Jl. A. M. A., May 1, 1915, proceeds as follows :—From

40 to 50 Cc. human blood is collected and placed in a large test tube which has been boiled in salt solution. (The Serum is stated to separate more rapidly and in larger quantity in a tube so prepared than in one sterilised by dry heat.) After separation, the serum is poured off and centrifugalised. To one-third of this serum is added a solution of mercuric chloride containing 0·022 Gm. (1/3 grain) per Cc., one Cc. of solution being added for each 2 Cc. of serum. A heavy precipitate of mercury albuminate appears, which redissolves on addition of the remainder of the serum. The resulting mixture thus contains 1/3 grain of mercuric chloride in 7 Cc. If heated $\frac{1}{2}$ hour at 55° C. and transferred to ampoules, the serum keeps indefinitely. Injections are made into the veins at the elbow with an all-glass syringe having a sharp needle. The initial dose in all cases was 1·75 Cc. (=1/12 grain), and was increased to 7 Cc. (=1/3 grain). Symptoms of ptyalism (in one case severe) appeared in several cases, but there was no occurrence of phlebitis or paraphlebitis. The syphilitic symptoms improved in all cases.

Ampoules containing 1/50 and 1/25 grain Mercuric Chloride are supplied.

Uses.—Tabes, general paralysis, tabo-paralysis and cerebro-spinal syphilitic meningitis well treated.

The method seems to us more sensible than that with Salvarsan-Serum containing hypothetical antibodies.—B.M.J. ii./15,477.

Ⓟ**Sal Alembroth.**—*Syn.* **Ammonio-Mercuric Chloride.**

$HgCl_2.2NH_4Cl,H_2O=396·54$.

May be made by mixing solutions of equivalent quantities of Sublimate and Ammonium Chloride and evaporating ; 3 grains represent approximately 2 grains of sublimate. A powerful antiseptic, but does not combine with albumin so quickly, and hence is not so irritating. *Uses*—In medicating dressings, **Bandages, Gauze, Wool Gauze,** and **Wool Tissue,** 1 or 2% (which are dyed blue), also as an intramuscular injection for syphilis.

Soluble 2 in 1 of Water, 1 in 4 of Alcohol 90%, also in Glycerin.

This salt was contained in the B.P. '85 Liquor Hydrargyri Perchloridi — W. Martindale, P.J. i./1870,544.

Ⓟ**Hypodermic Injection of Sal Alembroth.**

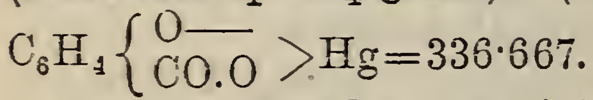
Sal Alembroth 5, Sterile Water 100. *Dose.*—10 minims every fifth to seventh day in syphilis.

Hydrargyri et Potassii Hyposulphis.

Dose.—Hypodermically $\frac{1}{6}$ grain (**0·01 Gm.**). **Sterules** are prepared.

Hydrargyri Salicylas.

Dose.—$\frac{1}{3}$ grain (**0·02 Gm.**) (internally). P.G. gives this as maximum single dose. Intramuscularly $\frac{1}{10}$ grain in 10 minims Liquid Paraffin (increased up to $\frac{3}{4}$ grain). (Cocaine Salicylate may well be added).



$$C_6H_4\left\{\begin{matrix}O—\\CO.O\end{matrix}\right.>Hg=336·667.$$

A white powder containing about 59% (U.S. 54 to 59·5) of mercury, very slightly *soluble* in water (but soluble in solutions of sodium hydrate and sodium carbonate), scarcely soluble in alcohol 90% *Used* as an antiseptic and antisyphilitic and as a dusting powder or ointment for sores. Should not be given in large doses with potassium iodide.

This is the basic mercuric salicylate as distinguished from the neutral or normal salt (*vide* below). Hydrogen sulphide distinguishes easily, the normal salt being precipitated at once, this one slowly. Two mercurous salts are also known.—Y.B.P 1903,294

As an injection for gonorrhœa 15 minims of a mucilage suspension 1—300, has been used.

Hydrargyri Salicylas, Neutrale.
$(C_6H_4.OH.COO)_2Hg=474{\cdot}75$.

Dose.—Hypodermically $\frac{3}{30}$ to 1 grain suspended 1 in 10 in Liquid Paraffin. Comparatively non-irritant.

Quinine Urea (2%) added to the injection relieves pain—thus the injection may be made as follows:—

Quinine Urea 2, Water 2, solve and mix with Anhydrous Wool Fat 20. To this add Mercuric Salicylate 10, Liq. Paraffin *q.s.* to 100.—Pres., Oct., 1912.

Prophylaxis of syphilis. The following jelly in **Collapsible tubes,** Neutral Mercury Salicylate 10, Irish Moss 5, Water 85.—Beddoes is used for smearing over the parts, it is not too strong for use to the tongue and other mucous surfaces. *N.B.—With caution.*

Hydrargyri Subchloridum, Mercurous Chloride. *Syn.* CALOMEL, **Mercurius Dulcis, P.H. Ned.** $HgCl=236{\cdot}096$.

Hydrargyri Chloridum Mite. U.S. *Syn.* PRÉCIPITÉ BLANC (distinguish from British White Precipitate).

Dose.—½ to 5 grains (**0·03 to 0·3 Gm.**). U.S., *average laxative* 2½ grains, *alterative* ¼ grain. FR. CX. has maximum single dose 15 grains, maximum during 24 hours, 15 grains.

Heavy white powder. We have also prepared it as *small, soft, scaly crystals* for eye work. The **Finely Divided Calomel of Duret** (B.M.J. i./19,713) is similar to this.

Insoluble in water, ether or alcohol.

Incompatible with acids, alkalis (*see* Lotio Nigra p. 471, with sodium and potassium chloride and with bromides, iodides, sulphur, cherry laurel water, and antipyrin.

With regard to Calomel and Sodium Chloride the usual view is that Mercuric Chloride may be formed. However, it is stated (P.J. i./11,499) that this is not the case. We know a case of a young man remarkably fond of salt who took 2 grains of Calomel after a big dinner. He was exceedingly ill and an emetic was necessary.

Taken internally is converted into Mercury Sulphocyanide with traces of Mercury-Albumin compounds. Since the solubility of Mercury Sulphocyanide is markedly increased by alkali chlorides, salt should be withheld from patients taking Calomel.—P.J. ii./10,438.

Uses.—Alterative and purgative. Was always considered a cholagogue. but at the present time is thought to empty the gall bladder only, not to increase the actual amount of bile formed. Most useful purgative for congested liver and dyspepsia generally. To be given at bed-time, followed by morning saline draught. Useful where there is intestinal putrefaction, *e.g.*, in dysentery, fæcal accumulation, typhoid. For torpid liver ¼ grain doses hourly valuable. Large doses are given immediately after a major surgical operation. As dusting powder to ulcers and many skin diseases (but not to the cornea of the eye if Potassium Iodide is being given). Applied dry relieves pruritus ani. In syphilis Calomel fumigations are sometimes excellent. In optic neuritis weekly injections of ¾ gr. have been successful.

Gall stones are often expelled after large doses of Calomel followed by Castor Oil.—Whitla, Pract. Med.

For neurasthenia and neuralgia, intestinal antisepsis is required. Begin with full doses of Calomel.—B.M.J. i./06,492.

Asthma is relieved by ½ to 2 grain doses. Give ½ grain at feeling of onset of attack.—B.M.J. ii./09,882.

In chronic ulceration of rectum 10 grain doses followed by 3 or 5 grain doses if improvement.—Pr. Aug. '09,152.

In influenza has been suggested.—Pres. Jan., 1911, p. 10.

Violent mania.—Calomel 30 grains administered to a violent maniac slightly under the influence of Chloroform subdued the patient after effecting profuse purging and vomiting. The patient slept and woke in a perfectly calm frame of mind.—Murray.—"Rough Notes on Remedies," P.R.S.M., Nov. '10, Baln. Sect., p. 7.

Diarrhœa.—Large doses of Calomel. 20 grain doses repeated twice in the first 12 hours in the acute enteritis met with in the Tropics with temperatures ranging between 103° and 106° and highly offensive coffee-ground evacuations—most successful. In dysenteric diarrhœa whether bacillary or amœbic, with or without rise of temperature, 12 grains repeated twice in the 12 hours is perfectly safe, but whether constipation be present or absent 1 grain every three hours in 12 doses results in pronounced salivation in adults—the same would occur with this dosage in children, though they are known to be much more tolerant of Calomel.—H. D. McCulloch, B.M.J. ii./12,1428.

Quinsy.—Calomel placed on the tongue in ⅙ grain doses and repeated every half hour for 12 to 18 hours stated to abort a quinsy. If used before suppuration occurs it may abort in 18 hours without purging. In two cases where suppuration had begun within the tonsil the method failed and strongly purged the patient.—B.M.J. ii./12,1249.

PEENASH, TREATMENT OF.—Peenash is due to the ravages of the larvæ of *Lucilia Macellaria.* One drachm of powdered Calomel blown into the nose or affected cavity kills the larvæ and causes them to drop out; washing out afterwards with a lotion will bring out the deeper seated ones. Infections with *Dermatobia noxialis* also treated in the same way.—B.M.J. i./11,362.

Enuresis, give ¼ grain daily to regulate bowels.—B.M J. i./06,905.

In raised arterial tension where indicative of danger, ½ or 1 grain pill once or twice weekly followed by saline in the morning keeps down pressure.—Brunton.

Suspicious cracks or hangnails should have this ointment well rubbed in:—Calomel 33, Vaseline 10, Anhydrous Lanolin 57.—*C.f.* Unguentum Prophylaxis.

In pregnancy Calomel is used with success to increase the elimination of toxic degradation products from the cells of the organism. 1/20 to 1/10 grain thrice daily may safely be continued throughout pregnancy. It should be well triturated with Sodium Bicarbonate which increases its action and lessens any tendency to salivation in cases of idiosyncrasy.—P.J. ii./11,707.

Calomel Tablets, 1/10, ⅙, ½, 1, 2, 3, 4, and 5 grains.

Injectio Hydrargyri Subchloridi Hypodermica. LAMBKIN'S ORIGINAL FORMULA.

In syphilis, Calomel 10 grains, suspended in Sterile Olive Oil containing 2% carbolic acid, ½ ounce. *Dose.*—10 minims injected once a week. Calomel is quickly absorbed but intensely painful, best used only as heroic measure.—B.M.J. ii./05,1255; L. i./09,396.

Sterules of Calomel of this form are prepared containing the 10 minim dose=½ grain Calomel approx. Also containing ⅙, ¼, ¾, and 1 grain of Calomel.

Morphine ¼ grain should be given afterwards to relieve pain.

Calomel injected with Oil in this way is partly converted into a soluble compound (probably Mercuric) and absorbed by the lymphatics and blood vessels and is partly taken up by Leucocytes and converted into a soluble compound within these.—Marshall, '08.

In tabes subcutaneous injection of 0·05 Gm. (¾ grain) Calomel every eight days whilst observing effects.—B.M.J E. ii./06,60.

Ⓟ **Lotio Hydrargyri Nigra** (*Off.* and 1898). BLACK WASH.

Mercurous Chloride, Glycerin, and Solution of Lime, about 1 in 150. Tragacanth Mucilage is now omitted. Contains Ⓟ **Mercurous Oxide*** $Hg_2O=417{\cdot}2$.

Ⓟ **Unguentum Cinereum** containing Mercurous Oxide 1 in 10 or 20 of lard has been prescribed for syphilis—distinguish from Oleum Cinereum *q.v.*

Ⓟ **Gargarisma Hydrargyri Composita.**

Black Wash 1 ounce, Potassium Chlorate 10 grains, Water 1 ounce For syphilitic throats.

Pilula Hydrargyri Subchloridi, Rhei, Cascara et Capsicin.

Calomel ½ grain, Rhubarb Extract 2 grains, Cascara Extract 1 grain, Capsicin ⅛ grain.

Relieves constipation, *e.g.*, that arising from large doses of Bismuth in treatment, see also Mistura Bismuthi, Phenolis et Morphinæ.—B.M.J. ii./10,184.

Pulvis Basilicus.

Dose.—For a child of 2 years, 4 grains (**0·25 Gm.**); of 6 years or upwards, 8 grains (**0·5 Gm.**).

Mercurous Chloride 3, Scammony 3, Acid Potassium Tartrate 3, Jalap 1, Ginger 1, Antimonial Powder 1.

Suppositoria Hydrargyri Subchloridi, L.H. Contain 1 grain of Calomel in each.

Unguentum Hydrargyri Subchloridi.—*Syn.* CALOMEL OINTMENT (B.P. 1898) was Mercurous Chloride 1, Benzoated Lard 9. It is now *Off.* double strength. A skin application which may relieve itching. —See also **Unguentum Prophylaxis.**

Calomel Cream, L.L. Calomel 10 grains to Vaseline 1 ounce. Distinguish from that of Lambkin—*q.v.*

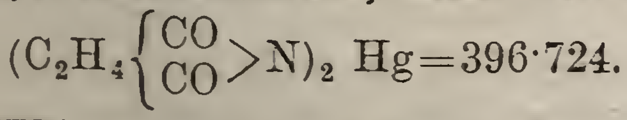
Hydrargyri Succinas.

$C_2H_4.(CO.O)_2Hg=316{\cdot}652$.

Dose.—¼ to ⅓ grain (**0·016 to 0·02 Gm.**).

White Powder *soluble* in Normal Saline Solution 1 in 40, 1 in 7 of 5% Sodium Chloride Solution, 1 in 5 of 10% Sodium Chloride, 1 in 2 of 30% Sodium Chloride Solution by experiment. The first solution may be used for injection—practically insoluble in plain water.

Hydrargyri Succinimidum, Imido-succinate of Mercury.



$$(C_2H_4\left\{\begin{matrix}CO\\CO\end{matrix}\right.>N)_2\ Hg=396{\cdot}724.$$

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* Note.—Ⓟ" Precipitate, Red and all Oxides of Mercury."

Dose.—By injection, $\frac{1}{4}$ to $\frac{1}{3}$ grain **(0·016 to 0·02 Gm.)**.

Prepared by adding freshly precipitated Mercuric Oxide 108 to a warm aqueous Solution of Succinimide* 99 and evaporating to obtain crystals.

A white silky powder, ***soluble*** in water about 1 in 28. Hypodermic injection in syphilis, in $2\frac{1}{2}\%$ solution = slightly over 1% of mercury. Addition of cocaine nitrate diminishes pain.

Our experiments showed it to be somewhat more soluble in normal saline—*i.e.*, 1 in 25, still more in 10% Sodium Chloride Solution, *i.e.*, 1 in 9, 1 in 14 of 5%, also 1 in 6 of 30%.

Sterules, Hypodermic of Mercury Succinimide, contain $\frac{1}{3}$ grain with Cocaine Nitrate $\frac{1}{6}$ grain

Pulmonary tuberculosis treated by $\frac{1}{5}$ grain in 10 minims of water every other day for 30 injections. Followed by Potassium Iodide 5 grains thrice daily for a fortnight, then one week's rest, injections resumed and so on. The Bacilli in sputum decreased.—L. ii./09,141. Has been both praised and condemned.—Pres., Jan., 1911.

Hydrargyri Sulphas. Mercuric Sulphate.

Syn. **Hydrargyri Persulphas.** $HgSO_4 = 296\cdot66$

B.P. 1885. *Dose.*—2 to 5 grains **(0·12 to 0·3 Gm.)**.

A white powder (made by dissolving Mercury in boiling strong Sulphuric Acid) water decomposes it with formation of yellow **Turpeth Mineral, Hydrargyri Subsulphas** Fr. Cx. **or Mercuric Oxysulphate,** $HgSO_4 2HgO = 729\cdot86$.

A prompt emetic in dose of 2 to 5 grains which has been given to children in croup and diphtheria to expel false membrane. Does not produce purging.

Unguentum Hydrargyri Sulphatis Flavi (Turpeth Mineral Ointment, Bazin's Ointment).

Yellow Mercuric Sulphate 15 grains, Benzoated Lard 1 ounce. Used for ringworm.

Mercurous Sulphate, $Hg_2SO_4 = 497\cdot26$.

A whitish crystalline powder slightly soluble in water and in dilute nitric acid. This salt, as also Mercuric Sulphate mixed with Potassium Bisulphate, is used for construction of electrical cells.

Hydrargyri Tannas, Mercurous Tannate.

Dose.—$1\frac{1}{2}$ grain **(0·1 Gm.)** in a pill. Should it cause diarrhœa in weakly patients add $\frac{3}{4}$ grain of tannic acid to each,or $\frac{1}{12}$ grain of opium.

In dark green, odourless and tasteless powder or scales, containing 50% of mercury. It is not soluble or materially affected by diluted hydrochloric acid, but is decomposed by alkalis. Chemical composition varies. **Pills** are made containing 1, 2, 3, and 4 grains.

Ⓟ **Unguentum Hydrargyri Oxidi Flavi.** *Off.* and B.P. '98.

Ⓟ **Yellow Mercuric Oxide** [$HgO = 216\cdot6$. Made by precipitating Mercuric Chloride with Sodium Hydroxide Solution] in

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[*] **Succinimide** $C_2H_4\left\{\begin{matrix}CO\\CO\end{matrix}\right\rangle NH = 99\cdot07$ **is made by dry distillation—preferably under reduced pressure—of either acid or neutral Ammonium Succinate. Recrystallise distillate from water.**

very fine powder 1, Soft Paraffin, yellow, 49. The powder and the resulting ointment should be neutral to moistened litmus paper.

Incompatibility.—Should not be used whilst patient is taking Iodide—violent irritation may be produced.—B.M.J.E. i./09,84.

Used for inflamed eyelids. Ⓟ **Pagenstecher's Ointment** is 4%, *i.e.*, double this strength; ointments of 1·25, 2·5, 5, and 10% are also prepared.

Syphilitic sores and eczema are well treated by the 1·25% ointment.

Martindale's Method of Manufacture.—

(*a.*) We recommend the Yellow Mercuric Oxide *to be freshly precipitated and converted into ointment without preliminary drying.* This produces a perfectly smooth ointment free from grit. It can be effected by taking the equivalent of Mercuric Chloride to start with. To manufacture say 10 Kilo of the Ointment of 10% strength, 216·6 parts of HgO are produced from 271·52 of $HgCl_2$ therefore $\frac{271\cdot52}{216\cdot60}$ = 1·25 kilo of Corrosive Sublimate will produce 1 kilo of Yellow Mercuric Oxide on precipitation with Sodium Hydroxide (Solutions must be very dilute). This is carefully washed until the washings do not react with either Silver Nitrate or Phenolphthalein, and pressed in suitable linen free from "fluff," and finally in this moist condition is made up to 10 kilos with Paraffinum Molle (Yellow should be quite as suitable as white). The amount of moisture in the precipitate is easily ascertained and allowance made for, and *is reducible, by pressing to a very small amount.* Weaker strengths can then be prepared from this 10% bulk, as desired, by dilution with Paraffinum Molle. If kept exposed to light, Yellow Ointment may turn dark on the surface. If desired, the ointment may be kept under water, or be placed in 'Collapsubes' (strengths as above mentioned). We have examined the contents of such Collapsubes two years after preparation and find same in good condition.—W. H. Martindale, Oph., Nov., 1906; L. ii./06,1459

R.O.H. also adopts this method. ½ to 2% strength.

Ⓟ **Unguentum Hydrargyri Oxidi Rubri.**

Syn. RED PRECIPITATE OINTMENT. (*Off.* and B.P. 1898).

Red Mercuric Oxide, in very fine powder 1, Paraffin Ointment 9. For use in chronic skin affections.

The Red Oxide is crystalline, and the Yellow (by precipitation), amorphous, but they are chemically identical.

Ⓟ **U.S. VIII.** had Red Oxide 1, Water 1, Hydrous Wool Fat 4, Petrolatum 4.

Lanolin used for this if applied over large surfaces may lead to severe Mercurial poisoning and is, therefore, to be avoided.—P J. i./11 407.

Ⓟ **Pommade de Lyon.** Red Mercuric Oxide 1, Vaseline 15.—P.J. ii,/15, 135.

Ⓟ **Unguentum Rubrum cum Cantharide. V.H.C.** Red Mercuric Oxide 1, Vinegar of Cantharides 1, Soft Paraffin 6.

Hydrargyri Sulphidum Rubrum. *Syn.* VERMILION, CINNABAR. HgS = 232·66. Brilliant red powder insoluble in water and dilute acids prepared by subliming a mixture of Mercury and Sulphur Both this and the black variety, **Hydrargyri Sulphuretum cum Sulphure** of same composition are not now employed therapeutically to any extent

Ⓟ **Unguentum Rubrum** (Blackfriars).—N. H. W.

Vermilion 6 grains, Red Mercuric Oxide 6 grains, Creosote 2 minims, Lard to 1 ounce.

Hydrargyri Naphthol-acetas. **Mercuric - β - Naphthol Acetate** $Hg.C_{10}H_7O.CH_3COO$=402·74

And the **Thymol Acetate** $(CH_3COO)_2\,Hg\,(CH_3COO.C_{10}H_{13}O)\,Hg = 727{\cdot}456$ are insoluble powders with *Dose.*—½ to 1 grain (**0·03 to 0·06 Gm.**). Schmidt gives *method of manufacture.*

They are antisyphilitics. The latter has been used as an intra-muscular injection suspended 1 in 10 in liquid paraffin.

Ⓟ **Hydrargyri Sulphocyanidum** *Syn.* MERCURIC RHODANIDE $Hg.(CNS)_2 = 316{\cdot}75$.

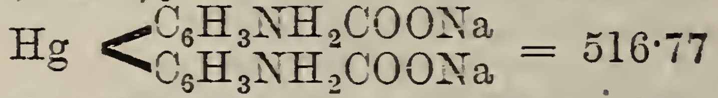
White powder slightly soluble in water. Swells up on burning, producing "PHARAOH'S SERPENTS"

We have had the following **Organo-Mercury Compounds** (prepared by G. T. Morgan) tried intravenously on animals :—

(1) **Mercury Anthranilic Acid.** $HOHgC_6H_3NH\,COOH = 353{\cdot}701$, thence the Hydrochloride $ClHgC_6H_3NH_2HClCOOH = 408{\cdot}621$, and the Sodium Salt $OH.HgC_6H_3NH_2COONa = 375{\cdot}693$. The two latter bodies are soluble in water but the Acid is a yellow insoluble compound.

(2) **Mono-Mercuro-dianthranilic Acid.**

$COOH.NH_2.C_6H_3.Hg.C_6H_3NH_2COOH = 472{\cdot}786$. Has been tried in the form of a 1% Solution of the Sodium Salt :



$$Hg < \begin{matrix} C_6H_3NH_2COONa \\ C_6H_3NH_2COONa \end{matrix} = 516{\cdot}77$$

(3) **Mercuro-Meta-sulphanilic Acid.** $HgOH.C_6H_3NH_2SO_3H = 389{\cdot}756$ has been tried in the form of a 1% solution of the Sodium Salt $HgOH.C_6H_3NH_2SO_3Na = 411{\cdot}748$.

The experiments showed that No. 1 (Sodium Salt) killed a rabbit in proportion of 0·11 Gm. per kilo (actual dose 0·2 Gm.) in 4 minutes. No. 2 in proportion of 0·2 Gm. per kilo (actual dose 0·36 Gm.) *had no obvious effect.* No. 3 killed in proportion of 0·13 Gm. per kilo (actual dose 0·2 Gm.) in 4 minutes. As control in these experiments Salvarsan in proportion of 0·1 Gm. per kilo (actual dose 0·24 Gm.) was tolerated without obvious effect ; 0·2 Gm. per kilo (actual dose 0·44 Gm.) killed in 2 days.

Sodium Mercury Dianthranilate is, therefore, a very promising compound. It has approximately half the toxicity of Salvarsan.—W. H. M., 1914

HYDRASTIS RHIZOMA.

Syn. GOLDEN SEAL.

NOTE.—*The preparations of this drug should be treated as Poisons in view of their uses, though we know of no actual fatalities from them.*

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

The dried rhizome and rootlets of *Hydrastis canadensis* (*Ranunculaceæ*). *Off.* not standardised. U.S. & P.G.V. is standardised to 2·5% Hydrastine.

Hydrastis Leaves and Tops contain Hydrastine.—Y.B.P., 1919, 14.

For assay and data on Chemistry of the Alkaloids, c.f. Vol. II.

Uses.—*Internally* it possesses tonic stomachic properties, being useful in general debility,—action not unlike that of quinine. Is used in intermittent fevers. The drug and the alkaloids Hydrastine and Hydrastinine cause uterine contraction and are efficient remedies in checking menorrhagia, post-partum hæmorrhage and in relieving dysmonorrhœa. Contains in addition to Hydrastine (1·5 to 3%) a quantity of Berberine, *q.v.* In gastric catarrh from chronic alcoholism is about the best substitute for the stimulant when this is abandoned. It is useful in fibroid tumours; does not cause painful contractions. Local application is often successful in chronic pharyngitis. In goitre it is successful.

Externally it is employed in chronic inflammation of the mucous membrane, also for cracks and fissures of the nipple. It stimulates unhealthy ulcers, and as a lotion (1 in 20 of liquid extract) checks profuse sweating, employed in acne and seborrhœa and stops nose bleeding. In gonorrhœa, more particularly the late stages, both locally and internally is of value; as an injection 1% solution of the liquid extract (or combined with 1% of Protargol and 5% Glycerin) is recommended.—H.

Ⓟ**Infusion** of 1 drachm in 8 ounces boiling water useful in vaginal gonorrhœa and leucorrhœa.—H.

Flavoring of Liquid Hydrastis preparations.—Syl Lavandulæ. Glyl or Syl Pini (in bold dose); Elixir Aurantii, Syrupus Limonis.

Ⓟ**Capsules** are prepared each equivalent to 30 minims.

Ⓟ**Fluidextractum Hydrastis, U.S.,** 1=1. *Average dose.*—30 minims (**2 Cc.**). Glycero-hydro-alcoholic precolate standardised to 2% ether-soluble alkaloids.

Fr. Cx. extracts with 70% alcohol.

Extractum Hydrastis Liquidum. *Off.*

Dose.—5 to 15 minims (**0·3 to 1 Cc.**) Is made with 60% alcohol, also standardised to 2% Hydrastine.

In pruritus ani for the varicosity of piles inject daily one or two ounces of the following, mixed:—Liquid Extracts of Hydrastis 2, Hamamelis 16, Ergot 2, Compound Tincture of Benzoin 2.

[P1] **Mistura Hydrastis et Ergotæ.**

Liquid Extracts of Hydrastis and Ergot of each 30 minims, Chloroform Water to 1 ounce for a dose.

This is one of the most powerful remedies for menorrhagia, and so also is a mixture of Hydrastis and Hamamelis.—W. W. W.

Ⓟ**Mistura Hydrastis Composita, W.**—Liquid Extract of Hydrastis and Liquid Extract of Hamamelis each 15 minims, Cinnamon Water to 1 ounce.

Ⓟ**Extractum Hydrastis.** *Syn.* Hydrastinum.—Prepared by alcoholic extraction. *Dose.*—2 to 5 grains (**0·12 to 0·3 Gm.**)

Fr. Cx. prepares with 60% alcohol and evaporates to soft extract.

Uses.—Aperient, cholagogue, stomachic, and tonic. 3 to 6 grains in a pill, followed by Effervescing Sodium Sulphate, is a useful biliary stimulant; is also used as a dressing to ulcers, acting as an antiseptic.

Glycetractum Hydrastis, *v.* **Glycetracta.**

[P1] **Hydrastina, Hydrastine,** U.S. Fr. Cx.

$C_{21}H_{21}NO_6$=383·283.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**). Fr. Cx. has max. single dose 1½ grains, Max. during 24 hours 4½ grains approx.

Pills containing ¾ and 1 grain are made.

An alkaloid in white prismatic crystals, slightly soluble in water but soluble in alcohol 90% 1 in 150, chloroform 1 in 2, and ether about 1 in 90; taste very bitter.

P1 **Hydrastinæ Hydrochloridum.** P. Belg. $C_{21}H_{21}NO_6HCl$= 419·751. + Aq.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**).

A crystalline soluble salt; said to act as an expectorant. Research on its action.—B.M.J.ii./98,1052.

Found to produce uterine action and induce abortion. without danger to the patient, injected hypodermically.—L. i./86,991.

P1 **Tablets, Hydrastine Compound.**—Hydrastine Hydrochloride ¼ grain, Ergotin ½ grain, Cannabin Tannate ½ grain. Efficient in checking menorrhagia and post-partum hæmorrhage.

P1 **Hydrastininæ Hydrochloridum.** Fr. Cx. Ph. Ital.

$C_{11}H_{11}NO_2.HCl$ (P.G.V. and U.S. Formula) = 225·621.

Dose.—½ grain (**0·03 Gm.**) *per os* or hypodermically in 10% solution. Fr. Cx. has Max. single dose ¾ grain, Max. during 24 hours 2¼ grains approx.

A salt of P1 **Hydrastinine,** $C_{11}H_{11}NO_2$ =189·153 + Aq. (Fr. Cx.). An oxidation product of Hydrastine, is allied to Cotarnine.

In pale citron yellow crystals, ***soluble*** 1 in 1 of Water (with blue fluorescence when considerably diluted). M.pt. 212° C. Has been used for internal hæmorrhage hypodermically. Useful in menorrhagia and dysmenorrhœa.

Ⓟ **Sterules, Hypodermic of Hydrastinine Hydrochloride** contain ¼ grain.

Hydrastinine is probably the active constituent of the drug. It acts immediately, while other preparations require some days' administration before any decisive effect is produced.

Purulent ophthalmia neonatorum has been treated by a lotion containing 1% with 0·1% Morphine Sulphate.

Neither Hydrastinine nor Cotarnine have any action on the coagulation time of the blood. Their rational application appears to be limited to cases of uterine hæmorrhage—they have a distinct though not very powerful effect in producing contraction of the uterus.—B.M.J. ii./10,1599.

Ⓟ**Tinctura Hydrastis** (*Off.* and B.P. 1898).

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Now prepared 10% of the Liquid Extract which is standardised. U.S. 1 in 5 of a mixture of Alcohol 94·9% by volume 2 and water 1. Standardised to contain not less than 0·4% ether-soluble alkaloids.

Fr. Cx.—1 in 5 by weight. Not standardised.

Flavoring.—As Extractum Hydrastis Liquidum *q.v.*

Ⓟ**Liquor Sedans.** *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

A specialty said to contain in 1 ounce Hydrastis (represented by white alkaloid Hydrastine) 60 grains; Black Haw (*Viburnum Prunifolium*) 60 grains; Jamaica Dogwood 30 grains; with aromatics. to restrain nervous irritability and as ovarian and uterine anodyne.

HYDROGENII PEROXIDI LIQUOR.

$H_2O_2 = 34{\cdot}016$.

Syn. **Aqua Hydrogenii Dioxidi, U.S. VIII. Soluté officinale d' Eau Oxygénée.** Fr. Cx. 12 vol. 'Hydroxyl.'

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

May be prepared by the action of diluted mineral acid (especially sulphuric acid) on barium peroxide* in presence of water.

Electrolytic method of making by treatment of Sulphuric Acid in the presence of Hydrochloric Acid or Hydrofluoric Acid. $H_2S_2O_8$ (Persulphuric Acid is first made).—P.J. i./16,3.

Method of making, using Phosphoric Acid and Barium Peroxide, also by passing steam through a mixture of Potassium Persulphate and Sulphuric Acid.—German Patents.—P.J. i./15,656.

The *Official* 'ten volume' Liquor yields 'ten volumes' of available oxygen when decomposed—*i.e.*, 1 Cc. will evolve 10 Cc. of oxygen, or 1·45% of its weight=3·04% by weight H_2O_2. It has the second atom of oxygen in a very loose state of combination. Twenty volume strength is also available in commerce.

Hydrogen Peroxide is produced naturally in many ways, as by the oxidation of oil of turpentine, oil of eucalyptus, &c. It is contained in 'Sanitas,' *q.v.* The solution is used for bleaching ladies' hair. It has a harsh bitter taste.

Incompatibility.—It readily decomposes, especially in contact with metallic oxide, such as that of silver or manganese, these if moist and freshly precipitated cause oxygen to be briskly evolved from it. Ether restrains this decomposition, and is used for making Ozonic Ether.

Further incompatibilities are Alkalis, Ammonia, Arsenous Salts, Carbolic Acid, Glycerin, Hypophosphites, Iodides, Mercurous Salts, Potassium Bromide, Chlorinated Soda and Chlorine Water.

For Assay and Preservation, see Vol. II.

Uses.–Internally is non-poisonous and has been given in diabetes, uræmia and epilepsy, also for pertussis, flatulent dyspepsia and enteric fever. For diarrhœa, vomiting of pregnancy, furunculosis and diphtheria. Is useful for assisting in removing surgical dressings which adhere obstinately. It is valuable, used *undiluted*, as a pigment or spray for diphtheria, tonsillitis, laryngeal tuberculosis, stomatitis, putrid bronchitis and non-syphilitic ozœna. For tuberculous and syphilitic ulcers, gangrene, malignant pustule and for purulent discharges is antiseptic. It is astringent, *e.g.*,in epistaxis, and styptic in removing polypi. Does not precipitate albumin. May be used locally for inoperable uterine cancer, chilblains, lupus, favus and other skin affections, also in gonorrhœa (up to 10 volume strength) occasionally. Wasp and hornet stings are at once relieved.

Guttæ. Otitis may be treated with the 10 volume solution preferably diluted with equal volume of water, but may be used stronger, *e.g.*, of the official strength. After syringing out with weak boric acid lotion, allow to remain in 15 minutes, syringe out again, and dry carefully. Hydrogen peroxide is useful as the first dressing after a radical mastoid operation.—B.M.J. ii./09,1323.

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* Soil contaminated wounds : Suggested use of, see Wounds.

Scarlatinal otorrhœa and ototis. When the discharge is thick and offensive nothing to equal the instillation of pure hydrogen peroxide (10 to 20 vol. strength).—Pr. Nov. '09,693.

A warm bath of 5 to 10 volume Hydrogen Peroxide useful to loosen the toughened masses of discharge in chronic cases of suppurative middle ear diseases. Will cure the most obstinate cases.—B.M.J. i./07,629.

Diphtheritic conjunctivitis is treated with a 10% dilution of the official Liquor. Empyemal cavities have been washed out with diluted solutions, but danger has arisen from embolism by the oxygen evolved. Also employed well diluted in erysipelas, and as an enema in dysentery.

In hay fever spray of Hydrogen Peroxide into the nose and on the conjunctiva proved efficacious.—Pres. 1910, p. 5.

In purulent conjunctivitis (gonorrhœal and membranous) 10 volume Hydrogen Peroxide satisfactory. In the former case used as warm douche (104° F.) destroys gonococci. Will reduce corneal opacity.—Pres., June, 1913, 198.

Not suitable for disinfection of drinking water, but suitable for sterilising instruments.—B.M.J. ii./09,1376.

In fistula in cleaning up unhealthy germinating areas and blind pockets Hydrogen Peroxide is invaluable—on no account should Silver Nitrate be used for this.—B.M.J. i./11,1048.

For septic wounds in war useful, does not damage tissues.—Sir W. Watson Cheyne, B.M.J. ii./14,870.

Good deodorant to clear a cavity or surface wound but not satisfactory as a wet dressing on gauze. The under layers become clogged and non-absorbent. Its mechanical effect is practically its only recommendation as a lotion for dressing—Casualty Clearing Station experiences.—A. Don. B.M.J. i. /16,648.

Neutralising Hydrogen Peroxide Solution with Calcium Carbonate and filtering is said to obviate the pain caused by syringing wounds in the ear with the ordinary acid preparation. This, of course, must be done only at the time of use as the solution would thus rapidly lose its strength.—H. Finnemore, P.J. i./14,421.

Gargarisma Hydrogenii Peroxidi.

Hydrogen Peroxide Solution 1 drachm, Sodium Chloride 5 grains, Glycerin 30 minims, Water to 1 ounce. (*Caution.—In a strong bottle.*)

Collutorium Hydrogenii Peroxidi.

Hydrogen Peroxide Mouth Wash.—*Martindale* ('10 volume').

Hydrogen Peroxide Solution (20 volume) 500, Oil of Peppermint 1, Saccharin Elixir 30, Thymol Water 470.

Astringent Hydrogen Peroxide Mouth Wash.—*Martindale.*

The above with 5% of Solution of Aluminium Acetate added makes a useful astringent antiseptic mouth-wash.

As a mouth-wash dilute either of the above with 7 parts of water.

We conducted a number of experiments using Krameria and other ingredients, but the above are the most satisfactory.

For painful ulcers of the mouth in syphilis either of these preparations is suitable—if necessary use stronger, *e.g.*, 1 to 4.

Tetanus Bacilli can be destroyed with hydrogen peroxide when they can be reached.—B.M.J. ii./09,368.

Chilblains well treated with the 10 volume preparation diluted with equal volume of boiled water (still hot) as lotion for 15 to 20 minutes twice daily.—B.M.J. i./09,276.

A mixture of equal parts of Hydrogen Peroxide and Sanitas in ozœna as spray with good result.—Austral. Med. Gaz., Sept. 14, 1912.

Unguentum Hydrogenii Peroxidi.

Hydrogen Peroxide Solution 10 (or less as ordered), Anhydrous Wool Fat to 100. Useful in eczema and other parasitic skin affections. Should be freshly made.

Dental Use.—The 20-volume strength can be used for acute or chronic periodontitis and gouty periodontitis by syringing out pockets around affected teeth after removing any calculous or other matter. May also be used for septic root canals.

***Dioxogen** (T.M. 358833). A name coined for 3% Hydrogen Peroxide solution.—L. ii./04,1576.

'Solid Hydrogen Peroxide.' *Hyperol (T.M. 343485) is the name given to a compound of Hydrogen Peroxide and Urea rendered stable by the addition of a trace of citric acid. Convenient for preparing solutions extemporaneously for general antiseptic use, as in the case of Hydrogen Peroxide. 1 Gm. added to 10 Cc. of water gives the 10 volume solution.

It can be used to differentiate fresh from boiled milk and for estimation of formaldehyde.—P.J. ii./11,668.

Hyperol Tablets are prepared. One added to 10 Cc. of water produces a 3% H_2O_2 Solution by wt. = 10 volume H_2O_2, suitable for general use.

Benzoxydol.—A combination of Hydrogen Peroxide and Benzoic Aldehyde introduced by Sir William Ramsay containing 15% Hydrogen Peroxide. Can be diluted with Boric Acid to any extent. Useful against anaerobic organisms. Diffuses rapidly and widely.—Sir W. Cheyne, L. ii./15,672

***Oxydol** (T.M. 363473) **Ointment** contains a large quantity of available oxygen. For eczema, frost bite and impetigo.—L. ii./16,23.

Ozonic Ether.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

A solution of about 1·2% by weight of H_2O_2 in ether (*i.e.*, 4 volumes approximately). It is ***Soluble*** in water in all proportions up to three times its volume, possesses properties similar to the above, and is more stable. In conjunction with Tincture of Guaiacum, it is employed as a test for blood, *v. Vol. II.* Has been given internally for diabetes and whooping-cough, and has been used locally for scarlet fever.

For bleaching teeth which have become discoloured from death of the pulp., etc

Method of Dental Use.—Isolate the tooth with rubber dam, and seal the apex with gutta-percha. The pyrozone is placed in the cavity on a pledget of cotton wool and volatilised with an air blast from the hot air syringe. Continue treatment for ¼-hour when a small amount may be retained in the cavity with gutta-percha or oxyphosphate. Use with caution in living teeth.

Hydrogenii Peroxidum Boratum.—BORATED HYDROGEN PEROXIDE.

Neutralise carefully (using Phenolphthalein as indicator) any desired quantity of Hydrogen Peroxide (previously examined to ensure correct) with caustic soda. Then add 3% boric acid.

Liberates oxygen on coming in contact with blood or other organic matter. Is particularly suited for a mouthwash for buccal and pharyngeal inflammation. Keep in ampoules or stoppered bottles.

In solutions thus prepared we found no material loss or decomposition on keeping for some little time,—the 10-volume preparation yielded 1·35% and the 20 volume 2·52% oxygen.

Loss of sense of smell returned (to our knowledge), after the use of this preparation as a nasal lotion

Magnesii Peroxidum.

Dose.—15 to 60 grains (1 to 4 Gm.).

A white tasteless powder insoluble in water, containing 15% of Magnesium Peroxide, MgO_2=56·32, with Magnesium Oxide, and is for use where increased oxidation is desired: given for weak digestion, anæmia, and in diarrhœa of phthisis, vomiting, anorexia, flatulence and pyrosis. Tests suggested.—P.J. ii./04,85.

5 to 10% added to precipitated or prepared chalk powder makes a good dentifrice.—P.J. i./07.284. **Tablets** contain 0·3 Gm.

Tablets and ' Stearettes ' of Magnesium Peroxide, 3 grains each are prepared.

Zinci Peroxidum. *Syn.* EKTOGAN, DERMOGEN. ZnO_2=97·37.

A white powder insoluble in water. Used locally in skin affections. Promotes healing of chronic ulcers. For burns and wounds.

Incompatible with Corrosive Sublimate. 10% **Unguentum** or dusting powder is used.

Sodii Peroxidum, Sodium Dioxide, F.E. Na_2O_2 = 78·0.

A yellowish white amorphous deliquescent powder, dissolves in water with production of heat and evolution of oxygen. 50% Solution has been used in dentistry to whiten stained teeth.

Unguentum Sodii Peroxidi. 20% in soft white paraffin may be tried with caution in acne. Technically used as bleach for sponges, wool, bones, oils, etc.

Cubes of Sodium Peroxide. *Syn.* OXYLITH, "SOLID OXYGEN."

Have been used for generating oxygen.

P1 HYOSCINA.

$C_{17}H_{21}NO_4$=303·263 (+Aq.).

A thick syrupy alkaloid, contained in *Hyoscyamus niger*, different species of *Scopola, Datura alba,* the flowers of which yield 0·5%, and other solanaceous plants.

It may be obtained from the Mother liquors of the preparation of Hyoscyamine. It is chemically and physiologically equal to Scopolamine. *Atropa Belladonna* apparently contains small quantities of Scopolamine. For the purposes of the Poisons and Pharmacy Act, 1908, we consider hyoscine as a ' belladonna alkaloid.'

For further details of the chemistry of this and allied alkaloids, Thorpe should be consulted. See also Lævo-Scopolamine, p. 482.

Uses.—Hyoscine is a powerful narcotic, especially useful in cases of insomnia, in calming excitement and delirium and producing sleep in acute mania. In such cases even double doses may be given. It is said to have no influence on the respiration, but to increase the action of the heart and circulation. As little as $\frac{1}{480}$ grain dilates the pupil in 18 minutes. The mydriasis is brief. It does not cause dryness of throat. Should be avoided in acute glaucoma.

It is considerably employed as an adjunct to, or substitute for ordinary anæsthetics in cases in which either light anæsthesia is required, or those in which the anæsthesia is 'likely to be prolonged and it is desired to restrict the ordinary anæsthetics as much as possible.'—B.M.J. ii./10,1451—being used largely in conjunction with Morphine in relieving the pains of labour. See p. 483 *et seq.*

Hyoscine relieves chorea, asthmatic attacks, pertussis and paralysis agitans, and the tremor of alcoholic excess. It has been given in vomiting of pregnancy.

In treatment of morphine and cocaine habits it has been used, but apparently not without danger.

Nocturnal spermatorrhœa is checked by $\frac{1}{200}$ grain doses in Chloroform Water by the mouth —W. W. W.

In the treatment of diathermasia (thermal stroke in the tropics) Quinine is of no use if malaria has been excluded. Strychnine should be avoided. The patient should be placed in an ice pad, and a hypodermic injection of $\frac{1}{75}$th grain of Hyoscine Hydrobromide should be given to quiet the intense cerebral hyperactivity. For thready pulse $\frac{1}{100}$ grain Digitalin is useful. After diaphoresis small doses of Ammonium Bromide may be given.—Brooke.

As hypnotic not advised in cases other than maniacal as its action is uncertain. In puerperal mania $\frac{1}{150}$ to $\frac{1}{50}$ grain may be given *by the mouth.* To quell mania dose of $\frac{1}{100}$ grain hypodermically has proved useful. Kidney disease and feeble state of heart do not contra-indicate its use. In paralysis agitans $\frac{1}{250}$ grain removes tremor.—Pr. Nov. 10,733. On discontinuing the medicine, however, these symptoms return, and again it often fails.—W. W. W.

In acute mania the following heavy doses are tolerated :—Chloral Hydrate 45 grains, Potassium Bromide 30 grains, Hyoscine Hydrobromide 1/40th grain in water to one ounce when required. (*Caution*—heavy dose). After a few doses the medicine may cease to have effect even when the Hyoscine is increased to 1/20th of a grain. A hypodermic injection (10 minims of a $\frac{1}{4}$ per cent. solution) of Hyoscine will, however, often subdue.—B.C.D. i./13,630.

Hyoscine possesses about 5 times the calmative power of atropine or hyoscyamine.

In locomotor ataxy Hyoscine Hydrobromide $\frac{1}{250}$ grain in Chloroform Water thrice daily.—Pres. Mar. 1911, p. 281.

Complete anæsthesia effected by $\frac{1}{40}$ grain in two blacks in Rhodesia.—Regarded as a maximum dose.—L. ii./10,884.

Hyoscine 1/150 grain, Morphia 1/3 grain. Anæsthetic for the Alcohol injection (*q.v.*) treatment of neuralgia. Give 20 minutes prior to the Alcohol.—W. Harris, L. i./13,881.

Antidotes.—Pilocarpine or Caffeine should be administered, also Tannin and Tea, after Emetics and use of stomach pump.

For details of the Crippen Poisoning Case and a toxicological experiment bearing on the matter, vide Vol. II.

A case of Hyoscine poisoning in a five-year-old boy. The child had eaten several tablets, each containing $\frac{1}{100}$ grain of Hyoscine

Hydrobromide, and was unconscious when the doctor arrived. An injection of $\frac{1}{4}$ grain of Pilocarpine Hydrochloride improved the condition of the boy within ten minutes, and next morning a complete recovery resulted.—L. ii./10,884.

P1 **Oleum Hyoscinæ,** 1% in Castor Oil. Causes a mydriasis which is certain, quick in onset and of transient effect. P1 **Unguentum Hyoscinæ,** R.O.H. Hyoscine base $\frac{1}{2}$, Soft Paraffin 100.

P1 **Hyoscinæ Hydrobromidum** *Syn.* **Scopolaminæ Hydrobromidum, P.G.V., U.S., Ph. Ned.** $C_{17}H_{21}NO_4.HBr.3H_2O$ = 438·239. P. Helv., P. Jap.

In white rhombic crystals, soluble 1 in 4 of water (or less), 1 in 14 of alcohol. Melts at 190° to 192° C. U.S. *Dose.*—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003** to **0·0006 Gm.**), increased to $\frac{1}{50}$ grain. P.G. has maximum single dose 0·0005 Gm., maximum *pro die* 0·0015 Gm.

N.B.—As initial dose we advise $\frac{1}{400}$ or $\frac{1}{300}$ grain. Patients vary in reaction to this drug.

The pure salt (water free) has, according to Schmidt, O.R. for a 6·5% solution at 15·8° C. $[\alpha]_D = -25° 45'$ Commercial Hyoscine Hydrobromide though often less lævo-rotatory than this owing to presence of dextro or racemic scopolamine, according to Schmidt does not differ markedly in physiological effect from that of pure **Lævo-Scopolamine.**

P.G.V. requires a 5% aqueous solution, calculated as anhydrous salt, to have a rotation: $[\alpha]_D$ at $15° = -24° 45'$. On adding 1 drop of potassium permanganate solution (0·1%) to 5 Cc. of a 1% aqueous solution, the red colour should not disappear within 5 minutes (apoatropine).

Jowett thought that as both Lævo- and optically inactive Scopolamine occur in the plant preparations may vary according to slight differences in ways of making.—P.J. i./13,401.

Resolution of Hyoscine and its components Tropic Acid and Oscine. There are possible four isomeric hyoscines.—H. King, C.D. '19,348.

We dealt further with this matter in the 15th Edn.

Lævo-Scopolamine is stated to act on the vagus three to four times, and on the oculo-motor nerve almost twice as strongly as *i*-scopolamine. An aqueous solution of the former does not lose its activity on keeping.—E. Hug (Arch. exp. Path. Pharm., 1912,69,45), J.C.S.A. ii./12,791. See also H. Finnemore, P.J. ii./12,136.

P1 **Guttæ Hyoscinæ, R.O.H.,** 0·5%.

P1 **Lamellæ** for ophthalmic use contain $\frac{1}{500}$ (R.O.H.) and $\frac{1}{200}$ grain.

P1 **Guttæ Hyoscinæ et Cocainæ, St. Thos. H.**
Hyoscine Hydrobromide 0·5, Cocaine Hydrochloride 1·0%.

P1 **Injectio Hyoscinæ Hypodermica.** 1 grain in 1,000 minims. *Dose.*—5 to 10 minims.

P1 **Liquor Hyoscinæ Hydrobromidi,** 1 in 1,000 of chloroform water. *Dose per os*—3 to 15 minims (**0·2 to 1 Cc.**).

Scopolamine Hydrobromide solutions stated to keep better by addition of a large amount of a polyatomic alcohol, *e.g., Mannite.* Thus Scopolamine Hydrobromide 0·2 Gm., Mannite 100 Gm., Distilled Water to 1 litre. The solution to be sterilised.—P.J. i./15,299. The authors have never had the slightest complaint of this liquor made with chloroform water.

P1 **Pilula Hyoscinæ Hydrobromidi,** $\frac{1}{400}$ to $\frac{1}{150}$ grain.

P1 **Hypodermic Tablets,** $\frac{1}{400}$, $\frac{1}{200}$, $\frac{1}{100}$ and $\frac{1}{75}$ grain in each. Severe poisonous effects from $\frac{1}{12}$ grain.—L. i./04,24.

For general *uses* and References to Hyoscine Salts *vide* Hyoscine *antea.*

P1 Scopolamine-Morphine Anæsthesia.

One of the physiological effects of Scopolamine is to induce temporary loss of memory. This is made use of in the "**Twilight Sleep**" method of inducing child-birth.

Scopolamine Hydrobromide $\frac{1}{200}$ to $\frac{1}{64}$ grain or more, and a salt of Morphine $\frac{1}{7}$ to $\frac{1}{2}$ grain are injected on the evening before the operation, and a similar or higher dose in the morning before the operation. This alone may suffice to produce deep sleep. If not, ether or chloroform may be given until complete anæsthesia occurs. Patients sleep for hours through the first painful periods after the operation.

In obstetric work the best dose is said to be $\frac{1}{100}$ grain Scopolamine, and $\frac{1}{6}$ grain Morphine given towards the end of the first stage of labour when the pains are coming regularly every few minutes. Occasionally second dose of Scopolamine $\frac{1}{200}$ grain, but no Morphine.—L. i./09,1459.

The Scopolamine in the majority of cases may be given equally well *per os.* Complete amnesia is not desirable—the purpose of the drug is considered fulfilled if the patient sleeps between the pains, waking up with more or less demonstration during the height of the contraction and again falling to sleep when the pain is over.—B.M.J. i./11,187.

Employ the method in sufficient dosage to produce drowsiness, and follow with a general anæsthetic at the time. Veronal at bedtime and $\frac{1}{2}$ hour before the operation Morphine $\frac{1}{6}$ grain with Scopolamine $\frac{1}{150}$ grain is recommended. Half a dose of each, or less may be given if necessary after 1 hour.—Leedham Green.—B.M.J. ii./09,962.

Dämmerschlaf is on the whole reliable. Pain is markedly diminished but it is not painless. Women of a higher grade of intelligence are best suited to the treatment, which is best carried out in primiparæ or multiparæ with tedious labours: it has no place in short labours. The method is ideal in patients suffering from cardiac disease.—A. J. Rougy, Med. Rev. of Reviews, Apl. 1915, per Pres.

Krönig's method described in detail. Authors employed this method rigidly in 40 cases. As initial dose Morphine $\frac{1}{4}$ grain and Hyoscine $\frac{1}{150}$ grain in majority of cases (36) and they think this dose of morphine the best. In one case the Hyoscine was given alone as a test to see if it would ease the pain but without result.

The smallest number of injections by which amnesia was obtained was 4 including the initial dose and the greatest number 45. The average number of Hyoscine injections per case was 11. The plain Hyoscine (1/450 grain) injections are given every hour or $\frac{3}{4}$ hour. The Morphine is not repeated in the latter part of the second stage of labour or the child may be born oligopnolic. A whiff of chloroform may be necessary if the Hyoscine is not taking effect. Of special value in primiparæ.—F. W. N. Haultain and B. H. Swift, B.M.J. ii./16,513.

Comparison of reports from various hospitals show the method requires considerable experience and should be withheld in all cases except where capacity for bearing pain is much below normal.—B.M.J. ii./17,791 ; see also Pr. Jany., 1917.

Scopolamine-Morphine-Atropine Methods :—

Morphine $\frac{1}{6}$ grain with Scopolamine, $\frac{1}{100}$ grain has been given the night before operation, after thoroughly emptying the bowel, and next morning after a rectal enema a further dose of the same quantity, and an hour before operation, *Atropine* $\frac{1}{100}$ *grain with Strychnine* $\frac{1}{36}$ *grain* is given subcutaneously. Less Chloroform is needed. Used in the most serious abdominal and pelvic operations.—L. i./11,737 ; B.M.J. i./11,757.

Dudley Buxton is of opinion that Atropine is an essential when 'open Ether' is used, as although Scopolamine produces similar effects yet when combined with Morphine its action in that direction is insufficient to counteract the injurious results of unstinted doses of Ether.—L. i./11,737.

F. W. Bailey doubts the necessity of including Scopolamine in the injection. If used, 1/200 grain is the dose with Atropine 1/100 and Morphine 1/6 grain.—B.M.J. ii./12,622.

A. F. Moxon uses Scopolamine Hydrobromide 1/120 grain with the other ingredients of the mixture as stated above—the injection being given $\frac{3}{4}$ hour before operation. Patient can then receive the anæsthetic without waking. Less anæsthetic is required.

L. E. G. Norbury uses Scopolamine Hydrobromide 1/75 grain, Morphine tartrate 1/6 grain, and Atropine Sulphate 1/150 grain two hours before op ration, supplemented by further $\frac{1}{4}$ grain Morphine 15 minutes before operation if necessary. The use of Scopolamine does not detract from the surgeon's and anæsthetist's difficulties.—B.M.J. i./13,612 ; L. i./13,825.

P1 **Sterules and Tablets, Hypodermic for Scopolamine-Morphine Anæsthesia** contain Scopolamine Hydrobromide $\frac{1}{100}$ grain with Morphine Hydrochloride $\frac{1}{6}$ grain in 10 minims.

P1 **Sterules of Atropine Sulphate** $\frac{1}{100}$ grain with **Strychnine Sulphate** $\frac{1}{36}$ grain in 10 minims are for use with these as above mentioned. They are also made with $\frac{1}{60}$ grain of strychnine sulphate.

Compound Scopolamine (Hyoscine) Sterules contain Scopolamine $\frac{1}{120}$ grain and Morphine $\frac{1}{8}$ grain with Atropine Sulphate $\frac{1}{120}$ grain in 5 minims of water.

Compound Scopolamine (Hyoscine) Tablets contain the same ingredients as the last.

Advantage of giving hypnotic before anæsthetic. Can be used with a safe Anæsthetic, *e.g.*, Ether.—L. i./11,737 ; B.M.J. ii./11,652.

Patients usually pass into profound sleep when the operation is finished, hence need watching for some hours, indeed until the narcotic effects have passed off. As the respirations are slow and shallow, time must elapse for the action of the drugs to pass off. The stupor need not alarm if breathing is regular and adequate and albuminuria or glycosuria are known not to be present. The average dose is Scopolamine $\frac{1}{100}$ *grain, Morphine* $\frac{1}{6}$ *grain and Atrophine* $\frac{1}{120}$ *grain one hour before the general anæsthetic—sometimes given in two halves, giving half one hour before and half just before inhalation.—B.M.J. ii.*/11,1150.

The method is of value where hysteria and distress manifest themselves during the first stage—if possible should be given only in this stage and not repeated. If so used there are no ill-effects to the mother even with full and repeated doses, nor to the child provided that delivery does not take place at four hours or less from the time of the last dose, otherwise apnœa of mother will ensue. The cause of apnœa, which sometimes occurs, is probably the Morphine, and so where it is necessary to give the drug later in the first or early in the second stage the Morphine should not be more than 1/6 grain or it could be omitted.—B.M.J. i./11,868.

Scopolamine $\frac{1}{150}$ and Morphine $\frac{1}{6}$ grain apparently caused still-birth —B.M.J. ii./11,1684.

So long as complete amnesia and not analgesia is aimed at and maintained there is no risk to either mother or infant. If pushed to the slightly further stage of analgesia the risk may be grave. Remarkable absence of exhaustion and shock upon the mother.—W. O. Greenwood, B.M.J. i./17,355.

Stovaine intraspinally 0·5 to 0·7 Cc. of 10% solution combined with twilight sleep in gynæcology.—F. L. Provis, L. i./18,152.

Twilight Sleep not free from danger. Consensus of views.—G. Blacker L. i./18,430. See also B.M.J.E. i./15,11; ii./15,3.

Crile's Anoci-Association *i.e.*, the exclusion of all harmful associations or stimuli. Scopolamine Morphine employed also Novocain Infiltration with Solution 1 in 400. In abdominal work Quinine Hydrochloride and Urea 5% of each in Normal Saline.—H. B. Butler and E. W. Sheaf, B.M.J. ii./14,113.

***Tocanalgine** (T.M. 362790). A proprietary for use for painless childbirth. The principal active constituent is morphine.

N.B.—Physicians are cautioned as to the doses in these methods, as statements vary greatly.

$\boxed{\mathrm{P}1}$ **Scopolamine Hydrochloride** ($+2H_2O$) and $\boxed{\mathrm{P}1}$ **Hydriodide** have properties and doses analogous to the Hydrobromide.

HYOSCYAMI FOLIA.

Jusquiame.—Fr. Cx.

Henbane Leaves consist of the fresh leaves; also the leaves and flowering tops separated from the branches and carefully dried. Collected from the flowering plants.—*Off.* not standardised, *c.f.*, U.S., etc., *infra.* The *Off.* leaves now conform with F.I.

Cultivation.—Those who have had practical experience in growing this plant in any quantity know what an exceedingly erratic and difficult crop it is to produce. The plant is, in fact, averse to cultivation—it prefers to come up where and when it feels inclined. Proximity to the sea-shore—often its natural habitat—is an essential. The tops of the young biennial plants die down in the autumn, and the roots remain quiescent during the winter. It is at this season that many of the plants succumb to the weather conditions and insect parasites. Self-sown plants—in waste places and on rubbish heaps—on the other hand grow luxuriantly, often to the height of 4 or 5 feet.—W. H. M.

Hyoscyamus grows wild on the north coast of Somerset.—B.M.J. i./18,388.

Uses.—Similar to those of belladonna and stramonium.

Colocynth and other strong purgatives in pills are rendered less painful in action by addition of Hyoscyamus Extract.

Hyoscyamus (Tincture) contains varying amounts and proportions of Hyoscyamine and Atropine and a varying amount of lævo and inactive scopolamine. The physiological activity of stereoisomerides varies.—H. A. D. Jowett, P.J. i./13,401.

U.S. directs leaves and flowering tops (second year's growth) yielding not less than 0·065% alkaloids. **P. Helv.** required 0·1%.

An average of a large number of United States samples, 1908—1911, showed that second year's Hyoscyamus leaves and flowering tops do not come up to the U S. VIII. Pharmacopœia requirement of 0·08% mydriatic alkaloids. Need of systematic 'breeding' of the plant.—F. A. Miller, P.J. ii./12,367.

P1 **Extractum Hyoscyami** (*Off.*).
Dose.—2 to 8 grains (**0·12** to **0·5 Gm.**).

This is now totally different from **Extractum Hyoscyami Viride**, B.P. '98. It is an alcoholic extract conforming with F.I., and is standardised (*Off.*) to 0·3% alkaloids. U.S. VIII. required this content also but U.S. IX. has 0·25%. Glucose is used as diluent.

Ⓟ**Tinctura Hyoscyami** (*Off.*).
Dose.—½ to 1 drachm (**2 to 4 Cc.**.). Powdered Hyoscyamus leaves 1 in Alcohol 70% to 10. This conforms with F.I.

Flavoring.—Syl Aurantii Amari, Syl Vanillæ; Syrupus Aurantii Floris.

Frequently the pain due to pyelitis may to some extent be controlled by Hyoscyamus Tincture in doses of ½—1 drachm.—Tirard Med. Treatment.

Baume Tranquille. Fr. Cx. (Huile de Jusquiaume Composée). Macerate powdered leaves of Belladonna, Hyoscyamus, Solanum Nigrum, Poppy and Stramonium of each 50, with alcohol 200, and allow to stand 24 hours then add Poppy Seed Olive Oil 5000, warm for 6 hours at 60 to 70°C. Press and allow to deposit, and finally add Oils of Lavender, Peppermint, Rosemary and Thyme of each 1 and filter.

Ⓟ**Fluidextractum Hyoscyami, U.S.** *Average dose.*—3 minims (**0·2 Cc.**). Strength 1=1; hydroalcoholic percolate, standardised to 0·065% hyoscyamus alkaloids.

The dried leaves are said to contain as much as 0·25% of total alkaloid of which ¼ to ¾ may be Hyoscyamine. The minute dark grey seeds of the plant contain 0·5% alkaloid, also a quantity of oil.
Fr. Cx. employs the seeds for making P1 Pilules de Cynoglosse opiacées.
Hyoscyamine is also contained in *Atropa Belladonna*, *Duboisia myoporoides*, *Datura Stramonium*, *Scopola Carniolica*, *S. Japonica*, and other atropaceous plants.

Hyoscyamus muticus. **Egyptian Henbane** contained 0·91% Alkaloids by titration.—Southall's Lab. Rep., 1907. Costs less than 1/20 of the medicinal drug. Has been imported in America and diluted with inferior henbane, as it contains 1 to 1·25% Hyoscyamine.—L. i./09,52.
It grows wild all over Egypt, where it is known by the name of 'Sakran,' the drunken. The alkaloid it contains is practically pure Hyoscyamine. In some respects it is superior to *Hyoscyamus Niger*.—Am. Jl. Ph., May/08,200, Aug./08,361.
It is now a drug of extreme importance as a source of Atropine—the hyoscyamine contained is easily converted into Atropine,—*vide* Hyoscyamine *infra*. The Germans had the astuteness to corner supplies in Egypt and sell the Atropine to us at fancy prices.—The late Gordon Sharp, P.J. ii./17,108.
This lævo- Hyoscyamine has been suggested to replace Atropine for opththalmic work—*vide* Atropine.

Ⓟ**Meglin's Pills.**—Hyoscyamus Extract, Valerian Extract, and Zinc Oxide each 1 grain.—In sciatica. Pr. Mar., 1911, p. 459.

Lactucarium, U.S. *Average dose.*—15 grains (**1 Gm.**).
The concrete milk juice of *Lactuca virosa* (*Compositæ*), the strong scented lettuce. Hyoscyamine is said to be a constituent of the fresh plant. Brownish masses with opium-like odour and bitter taste, partly soluble in alcohol and in ether.

Tinctura Lactucarii, U.S. 1 in 2. *Average dose.*—30 minims.

Syrupus Lactucarii U.S. (1 in 20). Tincture of Lactucarium, U.S., 100, Glycerin 200, Citric Acid 1, Orange Flower Water 50, Syrup to 1,000. *Average dose*;—2 drachms for insomnia.

P1 HYOSCYAMINA.

$C_{17}H_{23}NO_3=289{\cdot}279$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), in cases of mania increased to $\frac{1}{16}$ or $\frac{1}{8}$ grain dissolved in water by means of diluted sulphuric acid, or in a pill. ***Antidotes.*** *See* Atropine.

An alkaloid obtained from *Hyoscyamus niger* and other Solanaceous plants.

A stereo-isomer of Atropine (which is inactive), into which it can be converted by heating or acting upon it with alkali. It is in light snow-white crystals. According to Schmidt O.R. of Solutions of Hyoscyamine is $[a]_D = -20{\cdot}97°$.

Soluble 1 in 120 of water, freely in alcohol, chloroform and ether. Is alkaline in reaction, and melts at 108°—109° C.

It has been found in *Scopola Japonica*—*q.v.*

P1 **Hyoscyaminæ Hydrobromidum,** $C_{17}H_{23}NO_3HBr = 370{\cdot}207$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), increased.

In small white crystals, soluble about 2 in 1 water.

Does not yield precipitate with platinic chloride (difference from most alkaloids) U.S. M.pt. 152.

P1 **Hyoscyaminæ Sulphas.** (*Off.*).

$(C_{17}H_{23}NO_3)_2H_2SO_4,2H_2O = 712{\cdot}666$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**).

In small white granular deliquescent crystals, soluble in water 2 in 1 and about 1 in 4 of alcohol 90%.

P1 **Hypodermic Tablets of Hyoscyamine Sulphate** contain $\frac{1}{100}$ and $\frac{1}{50}$ grain. P1 **Ophthalmic Discs** contain $\frac{1}{5000}$ grain.

Guttæ Hyoscyaminæ (*vel* **Daturinæ** *vel* **Duboisinæ**), **R.O.H.** 0·25%.

P1 **Granules** of **Hyoscyamine** $\frac{1}{100}$ grain (**0·0006 Gm.**) are used for sea-sickness. *Dose*, occasionally a day or so beforehand, and for the first few days on board; hourly if required.

Uses.—As a mydriatic it acts like atropine, but with greater intensity, while the duration of effect is about equal.

It removes the pain of neuralgia, has cured mercurial tremor, paralysis agitans, and relieves puerperal mania and delirium tremens.

When used hypodermically, is most valuable in calming the violence of a furious maniac, or a noisy general paralytic. $\frac{1}{16}$ grain has been given three times a day, increased to $\frac{1}{8}$ or $\frac{1}{4}$ grain as single doses; requires care in administration.

P1 **Duboisine** from the leaves of *Duboisia myoporoides* is identical chemically with, and physiologically similar to Hyoscyamine. It is in amorphous very hygroscopic granules.

ICHTHOSULPHOL.

✶**Ichthyol** (**F. Ital.**). Trade Marks.—See 39599 (Class 2) and 39600 (Class 3), (Names and Designs). 59155, ·6 and 7 (Classes 2, 3 and 48 respectively). ✶**Ichthyolate,** No. 64841, and ✶**Ichthyolicum** 64842.

Syn. ✱ITTIOLO (T.M. 387765), ✱LITHOL-CIBA (T.M. 372883), ✱SAUROLO (T.M. 324693). AMMONIUM SULPHO-ICHTHYOLATE. (**P. Belg. P. Jap.**) PATENTS 10,523/1884 and 6044/1893 ***Expired.***

Dose.—10 to 30 grains (**0·6** to **2 Gm.**) per diem.

A viscous, brownish substance, with a disagreeable odour obtained by destructive distillation of a fossil fish deposits, and treating the basic oil thus made with sulphuric acid and neutralizing with ammonia.

Soluble in water, glycerin, ether, fats, oils, and partially in alcohol 90%. ***Uses.***—Internally has been given for rheumatism and skin affections, and as an intestinal antiseptic in constipation and dyspepsia. Reduces expectoration and cough in phthisis ; also stated to be useful in whooping-cough. Externally it is used in chronic skin diseases, as eczema, psoriasis, acne, and favus. The odour may be disguised with Oil of Citronella, which is itself used in Ceylon for rheumatism. Applied on wool as vaginal tampon, and as pessaries and suppositories, and as injections 2 to 5% (Lock Hosp.) in gonorrhœa, cystitis and vaginal discharges. Also applied to cracked nipples and erysipelas. For prurigo senilis a 30% solution in water is recommended ; for pruritus and ulcers a 10% solution ; may be combined with preparations of lead and mercury without the formation of sulphides. For burns it has been used diluted with zinc oxide or bismuth (the powder being spread evenly over the surface), or in ointment (10 to 50%). In mumps the swelling and pain are said to be rapidly relieved by inunctions of equal parts of Ichthyol and Lanolin.

Wounds in war have been treated by it in conjunction with glycerin. —*See* wounds.

Erysipelas in a large suppurating wound on the arm well treated by painting with Ichthyol and Glycerin *p. aeq.* covered with oiled silk. Simultaneously a mixture containing 2 drachms of Liquor Hydrarg. Perchlor. every four hours. Wound then dressed with hypertonic Saline. Same treatment for a bad case of boils from the trenches also successful.—B.M.J. i./16,201.

Composition.

Is not a definite chemical compound. Ether separates neutral oils insoluble in water. Alcohol removes salts soluble in water. 12·51% sulphidic sulphur, *i.e.*, in non-oxidised state (originally combined in the hydrocarbon oil before sulphonating) is present—other preparations of the same nature show considerably less.—C.D. ii./09,935 ; see also P.J. i./08,9 ; ii./12,693.

According to a partial analysis the total Sulphur is 10·3% of which 8·92 is organically combined and 1·38 is in association with Ammonia. Total Ammonia 3·23% ; 43·74% water.—L. i./13,328

The variety known as **Saurolo** obtained at Méride and Besano (Switzerland) is stated to yield 52 to 55% dry substance at 100° C. and a Sulphur content of 15%.

Lithium and Sodium Sulpho-Ichthyolate. *Dose of either.*—10 to 30 grains (**0·6** to **2 Gm.**) per diem.

Zinci Sulpho-Ichthyolas. For external use.

Capsules of **Ichthyol** and of **Lithium-Ichthyol,** 4 grains (**0·25 Gm.**) each (or combined 2 grains of each). **Tablets** 2½ grains.

Collodion 7 parts, with Ichthyol 1 part, is used for eczema, erysipelas, and other skin diseases.

Mistura Ichthyol. *Dose.*—1 to 3 drachms in water.
Ichthyol 6, Simple Elixir 20, Water 10. Another form is Ichthyol 2, Peppermint Water 7½, Syrup 2½.

Pilula Ichthyol.
Ichthyol 2½, Compound Tragacanth Powder ½, Liquorice Powder 1½ grains. Make a pill, on hot plate if necessary.
With Lithium and Sodium Ichthyol less Liquorice will suffice.

Pessaries of Ichthyol, 10% strength, with either Gelatin or Cacao butter basis are used for leucorrhœa, and 2 to 5% in gonorrhœa of the female.—L. ii./04,1223; also made with **Resorcin**, 3% must be made with Cacao Butter basis. *See also* **Ovules.**

Suppositories of Ichthyol may contain 3 grains (**0·2 Gm.**) with a basis of Theobroma 12 grains. The mixture must be almost 'set' whilst pouring into the moulds, otherwise may separate. The addition of beeswax is not desirable; indeed a large proportion will render the suppository quite insoluble. May also be made, *if for immediate use*, with **Glyco-gelatin basis.** Do not overheat the mass, or it may become insoluble. They may also be prepared with starch jelly with a little Formalin added as preservative. (*Physicians should specify which basis they prefer.*)

Unguentum Ichthyol may be made to contain from 20 to 50% with lanolin or with olive oil and lard. For psoriasis and erysipelas. May be perfumed with otto of rose *q.s.*

In slight blepharitis without ulceration bathe twice daily with 1% sodium carbonate solution and apply at night along the edges of the lids a little of an ointment of Ichthyol 1, Zinc Oxide 2, Soft Paraffin 10, Hydrous Wool Fat 10.

In blepharitis with thick crusts, moist warm compresses are required to soften and remove the crusts; then treat as above. In blepharitis with ulceration use moist compresses to detach the crusts and clean the palpebral borders. Mercuric cyanide (1 in 5,000) may be needed as more powerful measure.—Pres., Oct., 1912.

Ichthyol Resorcin, contains Resorcin 10% for external use.

Ichthyol Paste for acne rosacea. Ichthyol 25, Carbolic Acid 2½. Dissolve in Warm Water 22½, and mix with Starch 50. Painted on the skin, quickly dries and is easily washed off.

Pasta Ichthyol et Olei Terebinthinæ.
Ichthyol 1, Oil of Turpentine 1, mix. Of value in chilblains.

Ichthosulphol Proteinate. ***Ichthalbin** (T.M. 223215). *Dose.*—¾ to 15 grains (**0·05 to 1 Gm.**).

According to one of the methods given in the Patent Specification 11,344/1897 now void a solution of 10 kilos of Ichthosulphol is added to a solution of 10 kilos of Albumen in 60 litres of water. To the mixture a dilution of 900 Gm. Sulphuric Acid in 10 litres of water is added with constant stirring, and the precipitate dried and powdered or washed with spirit. We tried this and found it to give satisfaction. The washing with alcohol is an advantage.

A combination of ichthyol and albumen, ; an odourless and tasteless brown powder. Used internally for eczema, nervous intestinal affections and during convalescence from fevers.

Ichthyol Salicyl is a powder made with either 25, 33⅓ or 50% of sodium salicylate for psoriasis, acne rosacea and for rheumatic pains, and has been given internally in pills for tuberculosis.

***Ichthoform** (T.M. 222252, Class 2, and 222253, Class 3).

PATENT 9157/1899 lapsed in 1907.

Manufacture.—We have found the following to produce a similar preparation.

Mix Ichthyolsulphonic Acid 200 Gm. with water 400 Cc. and add Formalin (40%) 25 Gm. Heat 10 hours on the water bath. Collect the precipitate, wash and dry at 100° C.

A compound of Ichthyol and Formaldehyde, insoluble in water. Intestinal Antiseptic, *e.g.*, in tubercular diseases.

Dose.—1½ to 5 grains (**0·1 to 0·3 Gm.**).

***Thigenol** (T.M. 260287) is similar but a sodium salt ; a 5% ointment relieves eczema. Thigenol Soap contains 10%.

***Sphagnol** (T.M. 246705).—A native tar product produced from peaty deposits. In blepharitis, eczema, piles, sores and burns. Detergent and relieves insect bites in tropical countries. **Ointment** (10%), **Medical Soap** (15%), **Toilet Soap** (5%), and Shaving Soap 5%, and **Suppositories**, 3 grains for piles, are made.—L. i./09,1465.

INFUSA CONCENTRATA.

These preparations are made of such strength that one volume diluted with 7 of water approximately represent the official Infusions. Farr and Wright recommended dilute Chloroform Water (Chloroform 1 in Water 1,000) either (*a*) by **Macero Expression** in which the amount of drug required per pint is macerated in 15 ounces of the menstruum in a closed vessel for 24 hours, strained, pressed, and the alcohol or tincture necessary then added and maceration repeated two or three times. The two latter liquors are evaporated and added to the first and made up to one pint. The third maceration may be omitted when dilute alcohol is used as menstruum, and for the second maceration only *q.s.* need be used to make the expressed liquids when mixed measure one pint. The dilute chloroform water is to be used to prepare diluted alcohol when this is employed as menstruum. (*b*) By **Repercolation** consisting in moistening half the drug with menstruum and percolating. The other half is then moistened and percolated with the first percolate—percolation being continued in a second percolator until 13 ounces (reckoned on pint formula) are obtained. Add the alcohol and any tincture, etc., in the formula and reserve. Complete the exhaustion. The weak liquors are evaporated and added to the reserved portion. The bulk is then made up to volume (1 pint).

When using diluted alcohol as menstruum simply percolate until 1 pint of percolate has been collected from the second percolator. This is the easier procedure. By whichever process they are made concentrated infusions must, to keep, *contain at least* 20% (*for export* 25%) alcohol.—W. H. M.

1% of Formalin Solution may also be used as preservative.

Broom, by (*b*),but not very satisfactory. **Buchu,** by (*a*) using dilute alcoho and add tincture 1 ounce to each pint. Diluted, however, not equal to the fresh article. **Calumba,** by (*a*) heating finally to 85° C. for 5 minutes. **Cascarilla** by (*a*) adding 6 dr. (B.P.C. 12 dr.) tincture to a pint. Diluted as good as infusion. **Chamomile** (*b*), dilute with alcohol, adding 1 drop of oil for each ounce of flowers used. **Chiretta** (*b*), satisfactory **Clove,** not satisfactory. **Cusparia** (*a*), good. Ⓟ**Digitalis** (*a*), will not keep more than one month —B.P.C. **Gentian Compound** (*a*), adding 2 drachms of orange and lemon tinctures to the pint. **Hops** (*a*), with alcohol. Use old hops. **Orange** (*b*), adding tincture 1 ounce. **Orange Compound** (*a*), adding 1 ounce orange and lemon tinctures. **Quassia** (*b*). **Rhatany** (*a*), if with alcohol more body, but not like official article. **Rhubarb** (*b*). **Roses** (*b*), with acidulated alcohol. **Senega** (*b*), with alcohol and a little ammonia. A little wintergreen oil to be added to finished product. Deposits in time. **Senna** (*a*), with alcohol and add essence of ginger ½ ounce to pint. Diluted is as good as the fresh infusion. **Serpentary** (*b*). **Valerian** (*b*), with addition of ammonia (B.P.C. uses 0·3% strong solution). Diluted, is superior to the fresh infusion.—P.J. i./06,163 ; C.D. i./06,252. Yields of extractive.—P.J. i./05,435. **Infusum Cinchonæ Acidum** (*Off.*, and B.P. 1898). Cannot be produced in a concentrated form.

These remarks apply equally to the *Off.* Infusions, but Cusparia, Hops and Serpentary are now omitted.

Some experiments comparing concentrated Infusions diluted "1 to 7" with fresh Infusions showed clear advantage of the latter in general properties. The use of the concentrated preparations is unwarrantable.—Thomas Stephenson. P.J. i./11, 255.

Infusum Quassiæ Concentratum (as injection for threadworms in children) should contain no alcohol.—B.M J ii./11,52.

Tisanes.—Infusions or teas (usual strength 1 in 10) of herbs are largely used by the laity in France, Italy, &c Those mostly in use are :—*Tilleul* from flowers of *Tilia Europea*—Linné. German—*Lindenbluthen* (anti-spasmodic, diaphoretic) ; Senna and Manna (largely used) ; *Queues de Cerise*, cherry-stalks (diaphoretic) ; Peppermint ; Tamarinds ; *Bourrache*, Borage-leaf tea ; Chamomile ; *Mauve* :—Malva Sylvestris, Marshmallow-flowers (demulcent) ; *Chiendent* couch-grass (kidney-tonic) ; Aniseed (both varieties), Linseed ; *Orge* (pearl-barley). A large number of other tisanes are prepared.—Ph: Notes, France and Riviera. Several are contained in the FR. CX:

IODOFORMUM.

TRI-IODOMETHANE. $CHI_3 = 393·763$.

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**).

Manufacture.—By acting upon Alcohol with Iodine in the presence of Caustic Potash solution at a temperature of about 70° C.

$$(6KOH + 4I_2 + C_2H_5OH = CHI_3 + HCOOK + 5H_2O + 5KI).$$

It is also produced by the electrolysis of an aqueous solution of Potassium Carbonate, Potassium Iodide and Alcohol.

The substance has characteristic odour, containing 96·7% iodine.

The yellow crystals—if minute—will pass through a dredger. A precipitated form is also available.

Antidotes.—Opiates, bromides, diuretics with 5 to 10% of Sodium Bicarbonate locally.—L. i./09,562.

Internally we have known it to be badly tolerated—may bring out a rash or crop of angry spots.

Soluble 1 in 8 of absolute ether, 1 in 10 of ether (Sp. Gr.0·735), 1 in 12 of chloroform, 1 in 95 of 90% alcohol, 1 in 14 of eucalyptus oil, 1 in 10 of collodion, 1 in 60 of vaseline and oil of almonds, and about 1 in 30 of olive oil. Almost insoluble in water, but dissolves 1 in 10 of Rubini's solution of Camphor, which disguises its odour.

Incompatible with calomel, silver and other nitrates, potassium chlorate, and nitrites.

Iodoformum Aromaticum is scented with Coumarin, 1 in 50.

To cover its odour it may also be mixed with Balsam of Peru, Menthol, Phenol, Thymol, Oils of Anise, Eucalyptus, Geranium, Peppermint, Rosemary or Sassafras, about 1 or 2%.

To remove the smell from the hands, utensils, etc., rub with a little crushed linseed and wash afterwards.

Uses.—Antiseptic, anæsthetic and sedative. Useful in gonorrhœa and syphilis (non-irritant). To sores as dusting powder or ethereal solution. Insufflations (*q.v.*) are used in throat affections. The (10%) ointment is a useful dressing to wounds.

Taken internally, Iodoform decomposes, and iodine is soon found in the urine; being non-irritant has given good results in intestinal hæmorrhage, tertiary syphilis and cirrhosis of the liver, also to kill tapeworm. Tuberculous peritonitis has rapidly recovered under Mercury and Chalk ½ grain with Iodoform ½ grain thrice daily.

Iodoform Oil (20 grains to 1 ounce of Olive Oil) useful as dressing in early stages in recovery after operation for fistula—the oil facilitating packing with dressing.—The first few dressings in these cases are usually painful.—B.M.J. i./11,1048.

Excessive administration may produce symptoms of exophthalmic goitre in susceptible persons.—Bristol Med. Chir. Jl., 1910.

Oleum Iodoformi et Creosoti. *Syn.* HUILE CREOSOTÉE IODOFORMÉE.

Boil Olive Oil 70 for half hour. When cold add Creosote 5, Guaiacol 1, and Iodoform 10, lastly Ether 30. Supply in sterile bottle.

Iodoform Formagules (*c.f.* **Formagules**).

Capsules (to show lack of pancreatic secretion), containing iodoform surrounded by **Formalised Gelatin** are prepared. If the pancreatic secretion is active, the capsule is dissolved and the iodoform set free. Iodine in the form of iodides and iodates can then be demonstrated in the saliva by testing with chloroform and a little dilute nitric acid. The test is a useful means of demonstrating, firstly, the length of time that food (in this instance the capsule) remains in the stomach, and secondly, whether the pancreatic secretion is active or not. If no iodine reaction is obtainable in the saliva after the administration of the capsule it may be concluded either that the capsule has not passed from the stomach, or that the pancreatic secretion is in abeyance.—Byrom Bramwell, Clinical Studies, Vol. II., 1904,350.

Another test is the administration of 2 to 3 ounces of Sugar before breakfast. The urine is tested in a couple of hours, when sugar is present disease of the pancreas is suspected.

Pancreatic Infantilism is improved by administration of Pancreatic Extract ¾ and 2 grains—0·05 and 0·15 Gm. respectively

Collodium cum Iodoformo.

Iodoform 1, Flexible Collodion 12. P. Jap. and FR. Cx. 1 in 10.

Acetone Collodion will dissolve 5%. A pigment to venereal sores.

Emulsio Iodoformi. *For injection into sinuses.*

Iodoform, in fine powder, 1 (Alcohol 90% *q.s.* to moisten. St. Barts., G.N.C., G.H.), Glycerin 7, Boiled Water 2. Mix well in above order.

Lister used simply 1 in 10 of glycerin. In **Glycerinum Iodoformi**, K.C.H., the Iodoform was washed with 1 in 20 Phenol.

Most effective before caseation has occurred. For filling a cavity in the bone, after removing caseating tissue, Iodoform 1 and Boric Acid 4 is useful.

Injectio Iodoformi. *For Bladder Injection.*

Iodoform, in fine powder, 1, Mucilage of Tragacanth 2, Water 7.

This is less irritating than the Glycerin Emulsion (should be diluted 20—40 times with warm water).

Gauze, Gauze Bandages, Wool, and Lint contain 5%, 10% and 20%. British made contains correct quantity.—G. Lenthal Cheatle, L. i./13, 1763.

Insufflatio Iodoformi.

Iodoform 2, Starch (carefully dried) 1. In specific affections of the throat, antiseptic and mildly caustic.

P1 Insufflatio Iodoformi Composita.

Iodoform 6, Boric Acid 6, Morphine Acetate 1.

Iodoform and Eucalyptus Bougies. **Cereoli Iodoformi et Eucalypti.**

Iodoform precipitated, 5 grains. Eucalyptus Oil 10 minims. Theobroma Oil 35 grains. To make a bougie 4 inches long. Used for acute gonorrhœa. When the symptoms have subsided, any remaining discharge may be treated by zinc sulphate injections.

Injectio Iodoformi Ætherea.

Phthisis treated by intravenous injection of Iodoform ¼ to ½ grain doses in 40% Liquid Paraffin in Anæsthetic Ether. Strength 10 minims to contain ½ grain of Iodoform. Cases received ½ grain every second day on an average—begin with ¼ grain to see how patient stands it.—Glasg. Med. Jl., May, '09,345.

Tuberculous abscess treated by 5—10% Ethereal Solution with or without Olive Oil and with or without Guaiacol and Creosote 2% of each.—L. i./10,637.

Early uncomplicated cases of phthisis with good veins can be cured by 3 or 4 months iodoform treatment. *Dose.*—¼ to 1 grain thrice weekly. No success with tuberculin —B.M.J. i./11,366.

In pulmonary tuberculosis injections of ½ grain doses, taking the average body weight as 150 lbs., would represent 1 in 2,000,000. Opinion expressed that this could have little effect. The method should be accompanied by immunisation with tuberculin.—L. i./13,37.

J. B. Coleman criticised the **Iodoform—Benzoyl Chloride** Treatment *i.e.*, using this body in place of Ether as solvent, and giving by *intra-muscular* injection in phthisis, as employed in Dublin in 1911. W. M. Crofton favours Iodoform injections—Benzoyl Chloride as a substitute for the Ether. Though Iodoform is inoperable against bacilli it liberates Iodine when in contact with pus.—B.M.J. i /13,1112 ; L. i./13,1245.

Benzoyl Chloride Solution must not be confused with Ether Solutions intravenously as originally advised. The Ether Solution liberates Iodine rapidly. yet it is non-toxic. A direct germicidal effect in the treatment of pulmonary tuberculosis may have to be abandoned. Patients treated by the method recover and remain well for years.—Thos. W. Dewar, L. i./13,1347 ; B.M.J. i./13,1249.

Over 3,000 injections intravenously given by Dewar's method without bad effect. It gives, it is stated, as good results as any other treatment now practised.—J Bain, B.M.J. i./13,1350.

Whooping cough treated by Iodoform intravenously. *Dose.*—1 and 1½ grains in 0·720 Methylated Ether Previously 40% Liquid Paraffin advised. It is now thought the less used the better. Where veins few or badly filled with blood use 2½ to 20% of Liquid Paraffin, but it aggravates coughing at the time. In pneumonia and obstinate pulmonary cough has given good results.—T. W. Dewar, B.M.J. ii./12,681 ; see also *ibid.*, pp. 823,907,1168.

Leprosy treated by ½ grain doses in a solvent of 3 minims Liquid Paraffin and 7 minims Ether intravenously.—L i./14,1806.

Iodoform 5 grains Cyllin 5 minims, Olive Oil ½ ounce in introthoracic sepsis as packing.—W .Gordon and M. E. Gates, B.M.J. i./18,173.

Injectio Iodoformi, 1/6 grain (**0·01 Gm.**) **cum Menthol** 1 grain (**0·06 Gm.**) in Almond Oil Solution 15 minims (**1 Cc.**).

For the treatment of phthisis. Patients state they can taste the iodine shortly after the injection. **Sterules of 1Cc. are made.**

Iodoform Varnish (Whitehead's).

Benzoin 4, Storax 3, Balsam of Tolu 1, Purified Ether 40; dissolve, strain, and add Iodoform 4. For surgical application.

Mencière's Solution 'A.' For embalmment of wounds. Iodoform 10, Peruvian Balsaam 30, Guaiacol 10, Eucalyptol 10, Ether 100.

Changes the aspect of wounds often of the most septic. Previous successive lavage with three antiseptics: Sublimate 1 in 1000, Carbolic 1 in 40, Hydrogen Peroxide 1 in 3. All germs and spores whether anaerobic or aerobic are not equally sensitive to the three.

This solution employed to soak wicks of gauze or injected into sinuses. His 'B' solution also used: differs from ' ' in the quantity of ether which is 1000 instead of 100. May be used instead of or in absence of Hydrogen Peroxide. Powerful antiseptics but sparing cells—in contradistinction to Iodine which causes necrosis of cells and leaves a surface which is an excellent culture medium for bacteria.—L. i./15,269; see also F. C. Madden, use amongst Turkish wounded, i./16,614.

Ophthalmic Discs (Gelatin) contain $\frac{1}{1000}$ grain.

Pasta Iodoformi R.D.H.

Iodoform 60, Tannic Acid 10, Liquefied Carbolic Acid *q.s.*

Cinnamon Paste and Iodoform Paste are also used by Dentists and are understood to mean Iodoform Powder mixed into a paste with Cinnamon Oil. Used for treating septic root canals.

Pencils of Iodoform, the thickness of a No. 9 catheter, for uterine medication, are prepared with iodoform 15%.

Pigmentum Iodoformi. *See* **Collodium cum Iodoformo** *antea.*

Suppositories contain 1, 3 or 5 grains in each with Oil of Theobroma *q.s.* For fissure of the anus and irritated hæmorrhoids.

Unguentum Iodoformi, *Off.* is 1 in 10 Prepared Lard. This new formula employing Lard is unsatisfactory. Iodine is liberated and it turns a dark colour.—D. F. Ritchie, P.J. ii./15,539. Potassium Carbonate 1% added to the formula prevents decoloration.—J. C. Umney, P.J. ii./17,213. R.O.H. 15% in Soft Paraffin.

Unguentum Iodoformi cum Eucalypto. R.O.H. Iodoform 2, Eucalyptus Oil 18, Hard Paraffin 40, Soft Paraffin 40.

Iodoform Vaseline (10%). A useful surgical dressing to wounds.

Basic meningitis treated by inunction of Iodoform Ointment (15 grains to the ounce of vaseline), rubbed thoroughly into the back of the neck and posterior part of the scalp night and morning. Small doses of Potassium Iodide and Bromide. Within a week temperature reduced and symptoms relieved. The method, it is believed, would lessen mortality from meningitis.—L. i./11,24.

Collapsible Tubes (with Catheter attachment) of **Iodoform and Eucalyptus Ointment** of each 5%, and of **Iodoform 5% and** $\boxed{\text{P1}}$ **Cocaine 2% Ointment** are useful for the treatment of gonorrhœal diseases.

Iodoform-Acetone. A Styptic antiseptic liquid stated to be made by mixing Iodoform 10 Gm. with Acetone 100 Gm., adding 3 drops of Ammonia, allowing to stand 3 days and filtering.—P.J. i./17,209.

Succedanea, or Substitutes for Iodoform.

Thymol Iodide, U.S. *Syn.* ***Aristol.** DI-THYMOL-IODIDE.

FR. CX. $[C_6H_2(CH_3)(C_3H_7)OI]_2 = 550{\cdot}132$.

ARISTOL: T.M. No. 93538 registered 1890. Renewed as from Oct., 1917.

PATENT: 5079 of 1889. Now public property

Manufacture.—Thymol 1·5 kilos is dissolved in 10 litres of water with addition of 0·8 kilo Caustic Soda and to the clear liquid is added a solution of Iodine 5·08 kilos in 6·5 kilos of an alkaline Iodide. Collect and wash precipitate at ordinary temperature. (From patent specification).—C.D., Jan. 30/15.

This formula gives a resinous precipitate which is with difficulty converted into powder form by treatment with caustic soda solution but the following formula gives a good non-cohering precipitate :—

Dissolve Thymol 1·5 and Sodium Hydrate 1·6 in Water 50; into this pour with constant stirring a solution of Iodine 6 (probably 4 would be enough), Potassium Iodide 8 in water 50.

Yield is about 2·9 from above quantities. Theory demands 2.75.

Possible equation :—

$$\underset{\text{300 approx.}}{2C_6H_3.CH_3.C_3H_7.OH} + 61 + 4NaOH = \underset{\text{550 approx.}}{\left\{\begin{matrix} C_6H_2.CH_3.C_3H_7OI \\ C_6H_2.CH_3.C_3H_7OI \end{matrix}\right\}} + 4NaI + 4H_2O;$$

The name " Iodo-Thymol Iodide " given in the patent does not convey any correct impression. Our analyses indicate a body of the composition Di-Thymol di-Iodide.

A brown powder containing about 45% Iodine ; must not be heated above 100° F. nor exposed to light. ***Soluble*** in Alcohol and Oils, insoluble in Water

Incompatible with alkalis, Mercuric Chloride, Metallic Oxides or anything decomposing Iodides.

Used for psoriasis, lupus. eczema, and for ozœna ; as dusting powder alone or diluted 5 to 50%. Ointments 2 to 10% and Pastes also employed. For blepharitis and conjunctivitis 10% in sterile Sesame Oil Solution is suggested, also for burns and ulcerations.

For skin ulcers with equal weight of dried Ferrous Sulphate.—L. i./09,1224.

Suppositoria (Theobroma basis), 1 grain in 15 grains for hæmorrhoids.

' Collapsubes ' of Aristol Ointment 10% for venereal diseases of the urethra.

Formamin-Ethyl-Iodidum. $(CH_2)_6N_4C_2H_5I = 296·136$.

Suggested Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

A combination of Hexamethylene Tetramine, and Ethyl Iodide. In white crystalline scales or needles. *Soluble* 1 in 2 of Water, and about 1 in 40 of Alcohol 90%. May be of use as a urinary antiseptic having a more or less sedative action. It is apparently stable in aqueous solution. The author has prepared this compound, but it is not suitable for internal use. Physiological tests showed that injections of the substance caused cirrhosis of the liver in a guinea-pig. Locally may be useful as an antiseptic.

Formidin. (Capsules contain 5 grains.)

Stated to be METHYLENE-DI-SALICYLIC-IODIDE $C_{15}H_{10}O_6I_2$. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**)

A white powder insoluble in water, alcohol and dilute acids.

It decomposes in the presence of alkali, hence used as intestinal antiseptic. applied locally in skin affections. Its action said to be due to the splitting off of salicylic acid, formalin and iodine, but the iodine content is somewhat less then theory demands.—B.M.J. i./08,1124.

Formidin Gauze sterilised moist in 1 square yard and 5 square yards in glass jars, also in cartons.

Formidin Tape, ½ inch wide, 10 yards long, in glass jars ; also 1½ inch, 5 yards.

Iodol.—*Syn.* TETRA-IODO-PYRROL. $C_4I_4NH = 570·718$.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Brownish powder, containing 89% iodine, obtained by acting on pyrrol with iodine in presence of alcohol. It explodes if rubbed with mercuric oxide. Decomposes at 140° C.

Soluble 1 in 145 of glycerin, 1 in 6 of absolute alcohol, 1 in 21 of 90% alcohol, freely in ether ; also in chloroform and oils. Insoluble in water.

Uses.—Painless wound dressing for buboes, ulcers, and ear discharges.

An ointment, 1 to 5 of Vaseline, and a solution, 3 parts to 35 of alcohol and 62 of glycerin, have been used for granular and chronic conjunctivitis with good results ; and a solution of iodol 1, alcohol 3, glycerin 21, as a pigment in diphtheria. Also iodol 2, menthol 1, almond oil 96, for throat spray or pigment.

1% of menthol covers odour of iodol, and is said to render it more active.

'Collapsubes' with catheter attachment of iodol ointment 5, with eucalyptus oil 10% with soft petroleum basis are made for treatment of gonorrhœa.

***Sozoiodol** (T.M. 82513). **Di-Iodo-para-Phenolsulphonic Acid.**

$C_6H_2I_2OHSO_3K$ (1 : 4)=425·962.

Contains 59% of Iodine and 7·5% of Sulphur. Has been combined with **Sodium** $C_6H_2I_2(OH)SO_3Na.2H_2O$ = 483·9 6. **Potassium** $C_6H_2I_2(OH)SO_3K$ = 464·0 4. **Mercury** $C_6H_2I_2(O)SO_3Hg$ = 624·5 6 and **Zinc** $[C_6H_2I_2(OH)SO_3]_2Zn6H_2O$ = 1023·374. The first is ***soluble*** 1 in 11 of water. It has been given internally in doses of 15 grains for diabetes. This and the Potassium Salt in 2 to 10% ointments and powders are used externally to wounds, abrasions, and skin affections. Lotion 2 to 10% for gonorrhœa, conjunctivitis, and as mouth-washes. They are all powerful germicides.

Sozoiodol-Mercury.—*Dose.*—¼ to ½ grain (**0·016 to 0·03 Gm.**) twice or thrice daily in syphilis, in yellow powder containing 31·23% Hg, injected in syphilis. It is applied to venereal sores, cracked nipples and parasitic skin diseases.

Traumatol, an Iodo-Creosol compound.

A greyish amorphous powder insoluble in water, used as a non-toxic antiseptic. A **Liquid** preparation is also made.

IODUM.

I=126·92.

Historical.—Discovered by B. Courtois, 1811, in the mother liquor from alkali manufacture from sea weed. Discovery as an element (Humphry Davy), Distribution in Nature, Manufacture, Action and Therapy.—G. Sharp, P.J. ii./13,98 See also D. Curie, Pr., Dec., 1912,846.

Kelp Industry in Scotland. About a ton of Kelp is obtained from 1 ton of Seaweed and this gives about 8 pounds of Iodine. The liquor on concentration yields Potassium Sulphate in considerable purity in addition to Sodium Carbonate, Chloride and Iodides.—P.J. ii./15,215. See also C.D. Nov. 21/14,

In the Black Sea, about the middle of the triangle formed by Sebastopol, Odessa and in the mouth of the Danube, 30 to 50 metres below the surface, a spacious field of a red alga exists in which may be important quantities of Iodine: likewise in the Sea of Azof.—P.J. i./15,41.

The following medicinal inorganic iodides contain the halogen approximately in these proportions :—Ammonium Iodide (NH_4I) 87·5%, Lithium Iodide (Anhydrous) (LiI), 94·75%, Potassium Iodide (KI) 76·4%, Rubidium Iodide (Rb I) 59·75%, Sodium Iodide (Na I) 84·6%. Strontium Iodide ($Sr\ I_2 + 6\ H_2O$) 56·45%.

Soluble.—In Water in 5,000, readily in Alcohol 90%, Ether 1 in 4, Chloroform 1 in 30 about, slightly in Glycerin. Very soluble in Potassium Iodide Solution.

For Notes on Iodine Estimation and the Iodine number of Fats, etc., see Vol. II.

Antidotes.—Stomach pump, Emetics (Apomorphine Injection), Starch, Saccharated Solution of Lime, Demulcents and Stimulants; finally, Opiates.

Sodium Hyposulphite would be best chemically. Sodium Tetrathionate is formed, which is stated to be non-toxic. A 10% solution will combine (decolorise) ½ its weight of Tinctura of Iodine. N.B.—*This refers to the F.I. Tincture, i.e.,* Tinctura Iodi Fortis *Off.* Let the patient sip a solution during intervals of vomiting.—M.P., Aug. 11/09.148. Poisoning by 4 ounces of liniment.—L. i./05,793.

Skin rash due to Iodine may resemble variola.

Uses.—Internally is variously used as Tincture *q.v.* in influenza, catarrhs, epilepsy, and to reduce obesity. Typhoid has been well treated with it combined with a little Phenol as a drink.—*Vide* Tincture.

Externally.—Irritates the skin, if too strong will blister. As counter-irritant painted on chilblains, over inflamed joints, spots of pleurisy, sore gums and scrofulous glands, to abort boils, and is injected as tincture to cure hydrocele, *c.f.* also Morton's Fluid for spina bifida. For ringworm (*c.f.* Coster's Paste). Is inhaled to check profuse expectoration in chronic bronchitis.

Iodine is a powerful germicide. A 1% solution has been stated to be equal to Mercuric Chloride 0·5%. *C.f.* **Skin Sterilisation** *postea* and Chapter on Antiseptic Powers, *Vol. II.*

Catgut (*q.v.*) is sterilised by immersion in 1% alcoholic solution.

Burns are well treated by a 2% alcoholic solution of Iodine.

Tuberculous testes well treated by (Durant's) injection of 1% aqueous solution (made with potassium iodide) into the epididymis. At first only a few drops are given. 30 injections alternate days. Also if satisfactory in other parts of the body.—B.M.J.E. ii./08,12; see also DURANT'S INJECTION.

In puerperal sepsis as a douche—*vide* **Injectio Iodi**.—C. H. W.

For tuberculosis the use of **Nascent Iodine** (PFANNENSTIELS' METHOD) by the mouth suggested, *i.e.*, by giving Sodium Iodide in doses of 0·5—4·0 Gm. per day, not more than 2 Gm. being given at one time, *per os*, and Ozone by inhalation immediately after. The Iodide is carried by the blood and meets the Ozone in the lungs. The Ozone is obtained electrically and escapes freely into the room or through a tube close to the patient's mouth. Treatment, not unpleasant, lasts 1 to 3 hours, twice daily.—Pres., Nov., 1910, p. 203.

In lupus the Nascent Iodine has also been obtained by internal use of Sodium Iodide and Hydrogen Peroxide locally on gauze tampons into the nose.—B.M.J. i./12,689. Sodium Iodide in small dose at first (daily). At end of the week 30 grains in the 24 hours. Nasal cavities packed with gauze containing Hydrogen Peroxide, and a little Hydrochloride Acid and Ferric Chloride.—L. ii./12,1784.

The method has also been used in laryngeal tuberculosis, and recently in the war.—*See* Wounds.

The treatment was used in a definitely tuberculous child who, in addition to lupus nasi, had tuberculous kyphosis and scoliosis of nine years duration. The case was simultaneously under Tuberculin. The Solution of Hydrogen Peroxide consisted of a pint of 10 vol. H_2O_2, to which 1 ounce of Acetic Acid B.P. had been added. It was sprayed on to the part every hour. Sodium Iodide 7½ grains *per os* every 4 hours. Six months of Tuberculin treatment alone had had no effect but the combined action cured.—B.M.J i./13,767.

In pulmonary phthisis Nascent Iodine without producing iodism can best be given by 30 grains of Potassium Iodide with 10 to 20 grains of Potassium Bicarbonate in a copious draught of water after breakfast—the alkali reduces tendency to iodism. A Chlorine Solution made from Potassium Chlorate and Hydrochloric Acid is then given at intervals until slight symptoms of iodism appear. In the case of children Hydrogen Peroxide may be used instead.—D. Curle, Pr., Dec., 1912,89,846; P.J. ii./12,780.

Two of the patients took Potassium Iodide and Chlorine daily for respectively 140 and 81 days until sputum examination negative Patients gained weight and strength.—D. Curle, Pr., Feb., 1913.

In phthisis, E. C. Reeve gives an account of use of the method. 30 grains of Potassium Iodide are given at 7 a.m. in ½ pint of water. Four hours later, 1 ounce of Chlorine Water in ½ pint fresh lemonade, repeated at 2 hours' intervals until sufficient has been given. At first 3 ounces of Chlorine Water are given daily. At end of three weeks increase dose to 4 ounces of Chlorine Water and later to 5 ounces. Slight headache may be produced. Sputum, weight, temperature, sleep and appetite improved.—Pr., Sept.,'13 and June,'14.

Iodism is produced by small doses of Iodide but not by doses of 10 grains or more. The maximum quantity of Iodine dissociated in the blood in 4 hours is 4 grains no matter how much Iodide is given.—H. Dally.—Pr., June, '14,806.

Corneal ulcer well treated by Tincture of Iodine applied with camel-hair brush. Cocaine instillations necessary before and after. —B.M.J. i./13,169. A solution of Iodine 0·05, Sodium Iodide 0·2. Water 30,—3 drops into the eye 3 or 4 times daily, also used.—Pres. June, 1913,200.

Cystitis treated with Iodine Vapor made by heating a little Iodoform in a small glass flask with conical tube to which a catheter is attached. The vapor is driven in with a small pump and allowed to act about three minutes.—L. i./13,1547.

A wonderful tonic for children, especially those of tuberculous tendencies, 2 minim doses of weak Tincture thrice daily in peppermint water. Improves appetite and imparts vigour.—H. E. Waller. Pres. April, 1917.

Incompatible with alkalis, alkaloids, starch, soluble lead and mercury salts, carbolic acid, chloral hydrate and sodium thiosulphate.

Chloroformum Iodi, 1 in 30.

Stains less and does not promote desquamation, itching or dermatitis like alcoholic solution.—*c.f.* L. i./06,1190.

Glycerinum Iodi.

Iodine 1, Glycerin 50. Heat carefully till dissolved,—some decomposition of glycerin takes place. A useful pigment, the skin does not harden by repeated application, nor peel off. Water helps solution, *c.f.* Morton's Fluid.

Glycerinum Iodi C.X., is Morton's Fluid, *sine Aqua.*

Injectio Iodi Hypodermica Fortissima.

Iodine 360 grains, Potassium Iodide 360 grains, Distilled Water 4½ drachms. Should measure exactly 1 ounce and contain ¾ grain free Iodine in each minim. *Dose.*—3 to 5 minims for fibrous bronchocele.

A grain of Iodine may be held in solution in a minim of fluid, by employing Sodium Iodide in the proportion of Iodine 3, Sodium Iodide 2, and Water *q.s.* to 3 volumes.

Iodo-Glycerin Solution. **Injectio Iodi, C.L.T.E.** *Morton's Fluid. Distinguish from Douche which is also called 'Injection.'* Iodine 10 grains, Potassium Iodide 30 grains, Water 25 minims, dissolve, add Glycerin to 1 ounce. In spina bifida about 30 minims have been injected into the tumour, also injected into solid goitre.

Injectio Iodi, C.H.W. IODINE DOUCHE.—Weak Tincture of Iodine 2 drachms, Water 1 quart. For injection in puerperal sepsis.

Gangrene of the vulva, vagina and cervix treated by a douche of normal saline, cutting away the gangrenous parts, then giving a weak iodine douche, followed by packing with Balsam of Peru gauze.—B.M.J.E. ii./00,43.

Indiscriminate douching by women a great mistake.—W. E. Fothergill B.M.J. i./18,445.

Petrolatum Iodi.—*Iodine Jelly.* Contains 2% Iodine. Employed for 'plugging' with gauze in surgical operations.

Iodinol.—*Martindale.*

Dose.—30 to 45 grains *per os* of the 25%=about 10 to 15 grains of Potassium Iodide. Hypodermically 30 to 90 minims (2 to 6 Cc.) of the 25% preparation. (Commence with the same dose of the 10% compound.)

Sterules, Hypodermic, contain 30 (2 Cc.) and 60 minims (4 Cc.).

For treatment of tertiary syphilis large doses (15 Cc.) slightly warmed have been given on alternate days hypodermically.

An additive compound of Iodine and Sesame Oil, in strength of 10 and 25% of Iodine, prepared by repeated iodising of Sesame Oil by means of Iodine-Monochloride. The preparation is a thick yellow oil. The 25% has Sp. Gr. 1·23, and the 10% 1·025. It permits of lengthy and continuous administration of Iodine. Either the 10% or 25% preparation may be used by inunction.

Soluble in ether and in chloroform in all proportions, insoluble in alcohol.

Capsules contain 2 Gm. of the 25% = about 10 grains potassium iodide.

Iodinol may be given in beer, wine, milk, shaken with syrup or emulsified as **Emulsio Iodinol** :—Iodinol 25% 2 ounces, Gum Acacia 1 ounce, Chloroform 12 minims, rub together and add quickly with vigorous agitation Water *q.s.* to 6 ounces. Dose of 2 drachms = about 12 grains potassium iodide.

Iodinol Tablets contain 3 grains of the 25% preparation, *i.e.*, ¾ grain Iodine = 1 grain Potassium Iodide. *Dose.*—Up to 90 grains (30 tablets) per diem.

Iodinol cum Extracto Malti.

Dose.—1 ounce (30 Cc.).

Iodinol 25% 1, Malt Extract (thick) to 4. A palatable method of administration.

Uses.—Scrofulosis, convulsions of children, tuberculous infections, *e.g.* of the larynx, pleuritic induration, facial paralysis, arterio-sclerosis, gout, bronchial troubles, actinomycosis, and syphilis have been well treated by internal and local use—in many affections either inunction or hypodermic injection can be employed. Uterine fibroids have been treated by injections. It has been found useful instilled for eye affections.

Taken *per os* it is thought to pass through the stomach into the duodenum,—here it is acted on by the bile and pancreatic secretions and is emulsified. The greater part of the iodised fat is ultimately stored up in the tissues, *e.g.*, bone marrow, liver, etc.

Asthmatic affections are relieved by an Iodinol capsule quickly without causing headache.—Canny Ryall.

(✱**Iodatol** (T.M. 364270) is a similar preparation made in 10, 20 and 25% strength).

For a comparison of the amount of Iodine in **Organic Iodine Compounds** with that in Potassium Iodide, *vide Vol. II.*

For a résumé of a number of these preparations and for formulæ for **Egg Combinations** of Iodine (in Mixture Form), see G. Sharp, P.J. ii./13,99,100.

Iodum Oleatum. (*Not for internal use.*)

An Iodine-Oleic Acid compound containing 10% of Iodine. When thoroughly rubbed into any part does not stain the skin, but is rapidly absorbed, and its specific effect is soon apparent. Suitable for inflamed joints, enlarged scrofulous glands, eczema and other skin affections, sciatica, sprains, chilblains; should prove of value in tinnitus aurium.

An elegant preparation (and stable) can be made by rubbing together Iodine 1 Gm., Sodium Iodide 0·25 Gm., and 1 or 2 drops of Glycerin, then adding prescribed amount of Cod Liver Oil or other oil.—P.J. ii./09,64.

Tinctura Iodi Fortis (*Off.*). *Syn.* **Liquor Iodi Fortis, Strong Solution of Iodine** (B.P. 1898).—PIGMENTUM IODI, LINIMENTUM IODI (B.P. 1885).

This is now 10% *w/v* and conforms with F.I. It is slightly weaker than B.P. '98. U.S. is 7%.

Excess of Potassium Iodide in preparations of Iodine. The proportion or ratio of the two bodies has varied considerably. The ratio 3 grains of Potassium Iodide for every 5 grains of Iodine, as in Liq. Iodi Fort. B.P. (and *Off.* 1914) is sufficient for rapid solution and this amount is economical.—T. E. Tawell, P.J. ii./13,837.

Puerperal fever. Swab out with strong Iodine Solution and give Liquor Ferri Perchlor.—Amand Routh, Jl. Obst. 1911.

Liquor Iodi (**B.P.** 1885).—*Syn.* LUGOL'S SOLUTION. **Liquor Iodi Dilutus, U.C.H.**

Iodine 2, Potassium Iodide 3, Water 40.

Liquor Iodi Compositus, U.S. Iodine 5, Potassium Iodide 10, Water to 100.

Mistura Iodi Composita E.L.—Tincture of Iodine 1 minim, Glycerin of Carbolic Acid 1 minim, Caraway Water to 1 drachm.

P 1 **Pigmentum Iodi et Aconiti.** *Syn.* TINCTURA IODI ET ACONITI.

Weak Tincture of Iodine 1, Tincture of Aconite (Fleming's) 1.

Periodontitis is relieved by Iodine, or Iodine and Aconite Pigment.

Pigmentum Iodi Æthereale.

Iodine ½, Alcohol 90% 3, Methylated Ether 2½. Has the advantage of drying rapidly.

Pigmentum Iodi et Olei Picis, Mid. H. *Syn.* PASTA IODI ET PICIS, COSTER'S PASTE.

Mix Iodine 1, Light Oil of Wood Tar 4, carefully, applying heat if necessary. Ebullition generally takes place by the chemical action between the two ingredients, a part of the oil is oxidised and forms a resinous deposit.

Uses.—For ringworm of the scalp; after well shaking the bottle it should be well brushed in with a stiff brush; a scab will be produced which should be removed in a few days, the part cleansed by soaking with oil, and then soap and warm water; after drying, more paste should be applied. It seldom causes pain.

Iodine, Chloral Hydrate and Carbolic Acid, equal parts, have also been recommended for ringworm.

Pigmentum Mandl, T.H.

Iodine 6 grains, Potassium Iodide 20 grains, Oil of Peppermint 5 minims, Glycerin to 1 ounce. Used as a throat stimulant.

Iodised Absorbent Wool 6% in rolls. To prepare, saturate cotton wool with ether containing sufficient iodine for above strength, as also sufficient glycerin to produce 5% in the finished article and expose to dry. Is said to have saved life in a case of double pneumonia.

Syrupus Iodo-Tannicus (Martindale).

Dose.—½ to 2 drachms (2 to 8 Cc.), containing ⅗ to 2½ grains of Iodine, in water or wine.

Iodine 2, Tannic Acid 2, Glycerin 20, Water 30, Syrup (with flavourings and carminatives) *q.s.* to 100.

Combine the Iodine and the Tannin in presence of the water, glycerin and syrup *q.s.* until no indication of free Iodine with starch, cool and add the other ingredients. This contains the Iodine to a great extent in the form of Hydriodic Acid.

Statements appear from time to time to the effect that the Tannin and Iodine are combined, *vide e.g.*, P.J. i./12,31.

Our own investigations (1913) show that the Iodine is certainly in the inorganic form. Experimentally we could determine 1·8 to 2% in this condition in the Syrup.

The Fr. Cx. Syrup is only $\frac{1}{10}$ this strength, viz. 0·2% Iodine.

Uses.—Of great value for enlarged glands in children and also as a tonic after removal of tonsils and adenoids. Suggested in lymphæmia, anæmia, dysmenorrhœa and pulmonary affections.

Specially useful in cases of chronic lymphadenitis associated with or independent of adenoids. In atrophic rhinitis has given good results especially when combined with arsenic, and in simple bronchocele supplemented by the external use of Iodine Oleate or **Unguentum Iodi Intinctum** (*q.v.*).—B.M.J. i./04,724; L. i./04,994.

In arteriosclerosis often more valuable than Iodides or Thyroid preparations.—B.M.J. i./06,126.

Syrupus Tann-Iodo-Phosphoratum.

Dose.—½ to 2 drachms. Contains 5 grains Monobasic Calcium Phosphate in 2 drachms of the Syrupus Iodo-Tannicus.—*Martindale.*

Vinum Tann-Iodo-Phosphoratum.

Dose.—½ to 2 ounces (containing 1 to 4 grains of Iodine). Is eight times weaker than the syrup above; is made with Malaga. These two preparations are elaborations of the Syrupus Iodo-Tannicus above, and are suitable as tonics for children and invalids.

Nourry's Iodinated Wine.

Dose.—Children 1 to 2 drachms, Adults ½ ounce, with meals twice daily. Contains ¾ grain (0·05 Gm.) approx. Iodine and 1½ grains (0·1 Gm.) approx. Tannin in ½ ounce. As a substitute for Cod Liver Oil and Iodides in lymphæmia, dysmenorrhœa, anæmia and phthisis.

B.M.J. i./09,1308, found Alcohol 11·5%, Glucose 21·4%, Glycerin 6·6%, Iodine 0·33%. 1 ounce contains about 1½ grains Iodine in combination.

Nourry's Wine and the B.M.J. Discussion as to Editorial remarks on before the Select Committee on Proprietary Medicines.—C.D. i./13,928.

Tinctura Iodi (Mitis) (*Off.* and B.P. 1898). *Dose* (for vomiting).—2 to 5 minims (**0·12 to 0·3 Cc.**).

Iodine 1, Potassium Iodide 1, Distilled Water 1; dissolve, add Alcohol (90%) *q.s.* to 40.

Should be recently prepared or is liable to contain Aldehyde and Hydriodic Acid. This aldehyde in presence of Iodine and water oxidises, forming more Hydriodic Acid as well as Acetic Acid. The Acetic Acid may become etherised forming Ethyl Acetate.—'Pharmacal Notes.'

A little Iodic Acid added to the Tincture will prevent decomposition—it breaks up Hydriodic Acid as formed.—P.J. i./14,713.

Flavoring.—Syl Lavandulæ, Syl Vanillæ; Syrupus Aurantii·

Antidotes.—See under Iodum.

N.B.—On the continent a 10% *w/w* Tincture is much prescribed, *e.g.* Fr. Cx. P.G.V. and P. Hung. have this with maximum single dose 3½ minims, maximum during 24 hours 14 minims approximately.—*c.f.* **Tinctura Iodi Fortis** (*Off.*).

Tincture of Iodine is given as a tonic before meals in tuberculosis, also in the commencement of "la grippe" and ordinary colds, largely used on the Continent with excellent results. In vomiting of pregnancy invaluable, and small doses in sea-sickness —B.M.J.ii./06,1718.

Arthritis and tuberculosis treated by 'intensive' treatment with the Fr. Cx. (10% *w/w* in alcohol 95%) Tincture—as much as 10 grains of Iodine per diem being given in this form.—Tom Bird, L. i./20,546. *Caution*: Much of the Iodine is no doubt precipitated and unabsorbed. The effect would be very different with a preparation containing Potassium Iodide.

Anthrax, in severe cases with œdema and erysipelas, injections of 1 to 2 drops of tincture at different points on the border of the erysipelas, about 5 to 10 Cm. apart using 8 to 15 minims in all. Repeated if necessary on following days. Also excellent in ordinary erysipelas, especially of the wandering type.—B.M.J.E. i./09,40.

Endometritis treated by **Churchill's Iodine Tincture** (dissolve Iodine 1,200 grains and Potassium Iodide ½ ounce in Water 4 ounces, then add Alcohol 90% to 16 ounces) applied subsequently twice a month for three months to the endometrium apparently diminishes the number of relapses following curetting.—B.M.J. ii./09,1030,1204.

In vomiting due to utero-gestation Tincture of Iodine 5 to 10 drops with Syrup and Water has been used.—Yeo.

In mercurial stomatitis Iodine mouth-wash (½ drachm of the tincture to an ounce of water) useful.—Yeo.

Typhoid.—A mixture of equal parts of **Tincture of Iodine and Pure Carbolic Acid**—two or three drops in a tumbler of water by the patient's bedside, and renewed as often as required. The tongue cleared, temperature fell, diarrhœa ceased, the fever was cut short. The action is probably due to the iodising of the blood serum. It is not clear how the Iodine could exercise direct effect on the intestinal ulcers, unless it were first absorbed from the stomach and excreted later into the intestine. Had this treatment been used in the South African War many valuable lives would have been saved.—David Walsh, L. i./13,1346.

Typhoid and Iodine.—Suggested extensive trial in hospitals. In enteric there is marked diminution in number of leucocytes. Iodine has a marked influence in increasing their number, and thus helping defence.—G V. Perez, B.M.J. i./13,117.

Cystitis treated by douche of 0·2% Tincture of Iodine. Non-irritating and efficient.—H. Lyon Smith, L. i./15,345.

Sterilisation of the skin of operation areas. The **Weak Tincture** *Off.* is adequate, preferably made with 70% spirit (*vide infra*), but the 10% solution (Tinct. Iodi Fortis) in 90% Alcohol has often been used, it may however produce acute dermatitis. The method was devised by Lionel Stratton—*vide* B.M.J. i./12,522.

Iodine Sterules are made in two forms :—

Form (1) encased in silk and absorbent wool. The "Sterule" is snapped between the fingers and the Iodine Solution is absorbed by the surrounding material, which is then gently dabbed on to the part required.

Form (2). These are similarly encased, and contain a **Concentrated Solution.** One "Sterule" placed in a bottle or cup with 4½ ounces of Alcohol 70% or 3½ ounces of 'S.V.R.,' with 1 ounce of water (in urgency use simply a gill of neat brandy or whiskey), produces a supply of fresh 2% Iodine Solution for use on larger surfaces. The "Sterule" must be gently tapped to break it and well stirred round,—the glass fragments are retained by the wrapping. For war the "Sterules" are placed in metal tubes, which could be carried by the soldier.—*c.f.*, A. G. Wildey, B.M.J. ii./12 437.

Ampoules made according to Whatmough's Patent No. 23,437/1914 have a bulbous end encased in a pad of material. This end is broken by striking the ampoule padded end downwards on some hard surface. The pad is then rubbed over the surface before applying the first field dressing.

Tuberculous sinuses are swabbed out with the liniment after operation.

As application to abrasions, cuts, scratches, etc., **Weak Iodine Tincture** (*Off.*) 2 parts, with Ether 3 parts, is used. Simple and time saving. Do not even cover the part afterwards if feasible.—B.M.J. ii./10,974.

Iodine for antiseptic purposes had its origin in pre-Listerian days. It was generally employed at Guy's in 1876. When the Iodine Solution is used warm it has marked tendency to arrest capillary bleeding or oozing. As a lotion add the strong solution to water until of light sherry colour, in septic cases make it darker.—B.M.J. ii./10,1004.

Instead of making a futile attempt to cleanse a wounded, work-soiled hand it is sufficient to paint the wound and surrounding tissues completely with the tincture. There is a little smarting, but it prevents inflammation or subsequent rigidity of the joints. Allow to dry before dressing with gauze, etc. It is wise to remove beforehand all comminuted bones and much mangled soft parts, but preserve even the smallest stump of thumb.—B.M.J.E. ii./10,77.

Rusty nail wounds and the like are well treated by packing the cavity with gauze soaked in Tincture of Iodine and allowing it to remain in for two or three days. If sutures are required the skin along the edges should be painted to prevent stitch abscesses.—L. ii./11,238.

The Iodine produces hyperæmia, which is the real agent in producing asepsis. The increased supply of blood is not only in the skin itself, but also in the subcutaneous tissue.—L. ii./11,442.

Tincture of Iodine made with 70% Alcohol sterilised non-spore bearing organisms in seven minutes whilst if of Official strength 10½ minutes; Sublimate Spirit (1 in 1,000), however, sterilised in 2½ minutes. Aqeous solution of Perchloride 1 in 1,000 never sterilised in under 30 minutes (!). Experiments on the skin were also conducted, amongst the conclusions being that Iodine—Alcohol (the Alcohol being 70%) is more potent than Alcohol alone, but the Sublimate Spirit is better. Neither guarantees absolute sterility.—B.M.J. ii./11,1078.

Sterilisation of the skin with a Petrol solution of Iodine—B.P. Tincture strength—cheaper than Spirit.—B.M.J. i./12,465.

In War (Hankow) 5% Solution found of great service.—No bad results even in cases where considerable absorption, *e.g.*, in shrapnel wounds.—B.M.J. ii./12,912.

Used in operation for appendicitis. As well as sterilising the skin, it no doubt increases leucocytosis in the area operated on. Used not only before the operation, but also over the skin sutures before applying the dressing of Iodoform Gauze, and again before the removal of the stitches, generally on the sixth day in children.—Major S. F. St. Dd.'s Green, Pr., Oct. 1912.

Fifty cases amongst the Egyptian fellah—patients with complete ignorance of cleanliness. Iodine 2% in Alcohol with an ordinary dressing—no Collodion Effective.—F. C. Madden, B.M.J. ii./12,765.

Used in a Caesarean section.—B.M.J. ii./12,1570.

A first-aid household remedy. It is harmless.—E. Owen, L. ii./13,1063.

T. Lynn Thomas relates his experience since the days of '**Bryant's Sherry**.'—B.M.J. i./13,12.

Smallpox.—Iodine applied prevents pitting and aerial dissemination.—Pres. Jan. 1913,5.

Pus formed in a deep sinus after use of Iodine in a ventrification operation (abdomen had been painted four times with 2% Solution). —B.M.J. i./13,100.

In the preparation of the skin with Iodine it is important not to wet the part first. 1% **in Benzene** the most satisfactory,—experience in the Balkan Wars.—L. i./14,76.

2% Iodine is about equal to 2% Phenol but from point of view of efficiency and comfort use Phenol in preference.—Sir Watson Cheyne.—B.M.J. ii./14,868.

Some people are intolerant to the method. It may produce dermatitis, though few cases have been reported.

J. L. Stretton, the originator of Iodine Skin Sterilisation describes his further work with the 2½% Iodine and 2½% Potassium Iodide in S.V.R. After 3,000 cases he finds no reason to alter composition of the solution. Preliminary washing and scrubbing unnecessary and positively harmful. Excellent in abdominal surgery. Coils of intestine, etc., may rest on the skin which has been sterilised with it.

Grossich's Solution (10%) is far too strong—would produce acute dermatitis in many people.—B.M.J. i./15,886. See also ii./15,278.

For all flesh wounds and abdominal and thoracic wounds paint a wide area with 2% Solution and wash the wound itself with 1 in 20 or 1 in 40 Carbolic or Iodine or strong Peroxide.—Sir A. A. Bowlby.—L. ii./14,1427.

In Naval Warfare—on the 'Tiger' was largely used.—B.M.J. ii./16,598.

Gas gangrene may possibly be prevented by local use, see Gas Gangrene. Tetanus cannot be prevented by injecting Iodine—see Tetanus.

For a wound in process of rapid cicatrization 1 in 15 of Alcohol 45% is ample—as used by Reclus (almost an equal quantity of Potassium Iodide to that of the Iodine will be wanted to make this). Nigay (Jl. de Med. de Paris, Apl. 16—per N.Y. Med. Jl., May 16) condemns the 10% solution in 95% alcohol as used by some military surgeons. It may destroy the healthy epidermis and cause a patch of eczema especially if not freshly made and containing Hydriodic Acid. (To remove this 1% of Iodic Acid may be used which in presence of Hydriodic Acid forms Iodine and water). He prefers the use of Reclus's Ointment, *q.v.*

Its use is very irritating to most skins and the pain continues for some time after the dressing is applied. Good Deodorant. Spirit solutions act like hypertonic salines by inducing serous flow.—Casualty Clearing Station criticism.—A. Don, B.M.J. i./16,648.

Our soldiers received a small amount of Tincture of Iodine in ampoule form for first aid in the war, but we believe this was discontinued.

Iodine in Liquid Paraffin. *Martindale.*

During the war we had occasion to conduct experiments with a view to making a preparation of Iodine in Liquid Paraffin for surgeons' use or indeed as a first-aid dressing to wounds. We determined that a Saturated Solution in Liquid Paraffin, Sp. Gr. 0·875 made in the cold is approximately 1% strength—the solution appeared to be quite stable (as compared with a corresponding Bromine Solution which we also made).

This strength is no doubt too strong to use to wounds—it would we believe be effectual diluted 10 or 100 times. A solution of this kind should have advantages over a spirit solution.

Bromine in Liquid Paraffin.—Experiments showed that this is out of the question—interaction occurs with either strong or dilute solutions—the solubility is in the neighbourhood of 1 in 25—single link compounds of which the bulk of Russian Liquid Paraffin is composed as is well known would substitute Br. thereby liberating H.Br.). Further work is suggested with this reaction product. It could be washed free from acid. *c.f.* p. 63 and Paraffinum Liquidum.

Clinical reports did not reach us direct, but we note that R. T. Dobson, B.M.J. ii./17,717, obtained good results from the preparation —strength not stated, in the treatment of trench-foot. It was used instead of plain oil for massage and seemed worthy of more extended trial.

Tinctura Iodi Ætherea.

Iodine 1, Pure Ether 40. For skin diseases.

Tinctura Iodi Decolorata, B.P.C.

Iodine 2·85, Alcohol 90% 27·5. Dissolve with a gentle heat, and add when cold Strong Solution of Ammonia 6·25. Keep in a warm place until decolorised (it takes some days), after which dilute it with Alcohol 90% *q.s.* to 100.

It forms a useful application for chilblains and for painting on exposed affected parts. The solution contains Ammonium Iodide with excess of Ammonia, about 0·1% Iodoform, and in some cases Ammonium Iodate, Hydroxylamine, and Acetaldehyde.—P.J. ii./14,130.

Tinctura Iodi Decolorata Fortis was described in the Extra Pharmacopœia 12th edition and is occasionally ordered. It is prepared as above excepting that after keeping the mixture of Iodine, Alcohol and Ammonia in a warm place until decolorised it is not diluted at the finish with Alcohol to 100.

Decolorised Iodine Tincture, Belladonna Liniment, of each 25%, Soft Soap 50%. Chilblains well treated with.—P.J. ii./13,829

Tinctura Iodi Oleosa.

Iodine 1, Alcohol (90%) 9; heat to dissolve, and add Castor Oil 2. Repeatedly applied does not crack the skin as the tincture does.

Unguentum Iodi (*Off.* and B.P. 1898).

Iodine 1, in 25 of a Potassium Iodide, Glycerin and lard basis.

The presence of Potassium Iodide (and Glycerin) is essential to the conservation of Free Iodine in this preparation. The Free Iodine content in the

Off. Ointment is considerably reduced after keeping for two or three months. A simple mixture of Iodine and Lard becomes rapidly attenuated in Free Iodine content—by chemical addition.—A.N.D. Pullen, P.J. ii./12,610.

Unguentum Iodi Intinctum, Stainless Iodine Ointment,—*Martindale.* Iodine 1, Oleic Acid 4. Heat to effect absorption and mix with Soft Paraffin 14 and Hard Paraffin 1 previously melted together.

Possesses iodising properties (*c.f.* Iodum Oleatum, the liquid equivalent) for use in rheumatic affections, enlarged glands, sprains, and syphilitic conditions.

✱**Kelpion** (T.M. 241134) and **Iodosol** are stainless Iodine preparations.

✱**Iodex** (T.M. 322589).—A stainless absorbable Iodine Ointment (containing 5%, together with a small proportion of free Iodine) to be either rubbed on to the part or applied and covered with oiled silk and cotton wool, to be used as above—where action of Iodine is required. Also made with **Methyl Salicylate. Suppositories** are made containing ⅜ grain Free Iodine in a neutral base. Each is coated with a soluble gelatin envelope. For use in fistula, anal fissures and hæmorrhoids.—L. ii./13,85.

Iodex applied on swabs to diphtheritic membrane and scarlet fever throats with advantage.—B.M.J. i./14,85

Unguentum Iodi Denigrescens. B.P.C. Iodine 5 per cent. in soft paraffin heated to combine. Found unsatisfactory—not of constant composition. Type of paraffin used makes alteration in Iodine content but in no case is it possible to secure 5 per cent. of combined iodine.—W. R. Pratt and Professor H. L. Smith, P.J. ii./15,542,544. Oleic Acid was tried to improve the formula and it was found that 18·2 per cent. of combined iodine was present after heating the acid with 90 per cent. of its weight of iodine (the theoretical quantity under ideal conditions) instead of the 47·39 per cent. that the fully saturated acid should contain.

The obvious conclusion is that our formula for Unguentum Iodi Intinctum (*Stainless*) in which the Iodine to Oleic Acid rate is 20 per cent. and which we devised some years ago is hard to beat.

Pasta Iodi et Amyli, U.C.H.

Starch, in powder, 1, Glycerin 2, Water 6; boil, and when nearly cold add Solution of Iodine U.C.H. 1. The latter is Iodine 1, Potassium Iodide 1, Water to 20.

Useful to cleanse and heal foul sores, especially such as are syphilitic (of the face).—Tilbury Fox. If applied on lint during the night, the sores may be hidden with calamine lotion during the day.

The original formula (as above designed) by the late W. Martindale need not be 'tinkered with.' It finds a place unaltered in many Hospital Pharmacopœias.—Peter Boa, P.J. i./15,485,501.

In the first edition (1883, p. 160) of the Extra Pharmacopœia, the composition is given as above (and has been so ever since). It is stated "in devising this formula the author found the addition of Glycerin was necessary to prevent it turning mouldy."—W.H.M.

Iodival. *Syn.*✱JODIVAL (T.M. 304500. MONO-IODO-ISO-VALERIANYL-UREA *Dose.*—5 grains (**0·3 Gm.**) thrice daily in tablets.

A crystalline compound containing 47% of Iodine, as a substitute for Alkaline Iodides. Stated to pass the stomach unchanged and to be absorbed in the intestines. It is thought to enter the blood as the Sodium Salt $(CH_3)_2CH.CHI CO.Na.N.CONH_2$, being slowly absorbed.

IODINE-ALBUMEN COMPOUNDS.

Iodoprotein, *Martindale.—Dose.*—10 to 15 grains (**0·6 to 1 Gm.** increased if desired.

A brown powder containing about 10% of Iodine and having slight odour of same.

Manufacture.—Dissolve dried Albumen 100 in Water 500 and add Sodium Bicarbonate 20, then treat with finely powdered Iodine (about 25 Gm.) at 40° C. until combination has taken place. NOTE.—It is believed that the substitution of Iodine in the Albumen molecule takes place in the customary manner with the result that an equivalent of Hydriodic Acid is produced. The mixture is then acidified with Acetic Acid and any excess of Iodine is removed by Sodium Thiosulphate. The precipitate is collected and washed free from Iodide, then dried and powdered.

Solubility.—The compound is insoluble in water and dilute Hydrochloric Acid; soluble, however, in dilute alkali, and for this reason this, and similar preparations, are advocated as substitutes for Alkaline Iodides,—assimilation is thought to take place in the intestines, and hence to cause no objectionable derangement of the stomach.

Uses.—In syphilis, arteriosclerosis, gout, rheumatism, exophthalmic goitre, asthma and in all cases where Iodides are administered beneficially, *e.g.*, scrofula, enlarged glands (orchitis).

Iodo-protein Tablets contain 10 grains (=1 grain of Combined Iodine).

A dose of Potassium Iodide containing Iodine 191 mgr. and a dose of Iodised Protein containing Iodine 188 mgr. were administered. The whole of the Iodine from both doses was excreted at the end of 48 hours, but the rate of excretion was different. At the sixth hour 37·7% Iodine was excreted in the case of Iodised Protein, as against 51·4% in the case of Potassium Iodide. In the same way the heavier salts of the halogens, such as Iodide and Bromide of Strontium yield up their Iodine and Bromine to the system at a slower rate than the correlated salts of Ammonium, Sodium and Calcium. Excretion may be rightly regarded as the measure of absorption, so that comparatively insoluble forms of drugs, *i.e.*, those of slower disintegration, are more likely to exert a longer continued activity.—Pres. Nov. 1911, p. 279.

✶**Seroden** (T.M. 329616) **Capsules** contain 1 grain of Iodine in combination with blood proteins.

Dose.—1 to 3 two or three times daily after meals.

Suggested for use in thyroid inadequacy, obesity, atheroma and aneurism, chronic rheumatism, rheumatoid arthritis and fibrosis. Also in chronic asthma and bronchitis and in conditions of high blood pressure and tertiary stages of syphilis.

Iodo-Casein.—*Dose.*—10 to 15 grains (**0·6 to 1 Gm.**).

A yellowish brown powder containing 15% Iodine. As an Inorganic Iodine Substitute. Insoluble in Acid, and partially dissolved in alkaline solutions.—*c.f.* Jl. A.M.A. 1912, p. 1,014.

✶**Iodoglidine** (T.M. 308519). *Dose.*—2 to 6 Tablets daily.

An organic compound of Iodine with vegetable albumen (wheat gluten) in tablet form each tablet containing ¾ grain Iodine. Non-depressant. Stated to be split up almost wholly in the intestine. The Iodine is thus gradually absorbed and the preparation is, therefore, non-toxic.

Uses.—In arteriosclerosis, gout, rheumatism, syphilis and tabes

Acidum Hydriodicum (*Off.*). *Syn.* **Acidum Hydriodicum Dilutum, U.S.** *Dose.*—5 to 10 minims (**0·3 to 0·6 Cc.**) in syrup.

May be made by interaction of potassium iodide, potassium hypophosphite and tartaric acid in hydro-alcoholic solution.

A colourless, sour liquid, which becomes dark in colour on exposure to light. If this happens on keeping shake with a little dilute Hypophosphorous Acid (*Off.* contains 1%). Sp. Gr. 1·085= about 12% of Hydrogen Iodide HI=127·928. (*Off.* and U.S. contain 10%). Commercially it is also prepared 20% with Sp. Gr. 1·17, and 46 to 47 % strength with Sp. Gr. 1·5.

Flavoring.—Syl Rosæ, Syl Origani; Syrupus Tolutanus, Syrupus Zingiberis.

Syrupus Acidi Hydriodici (*Off.*).

Average Dose.—30 to 60 minims (well diluted).

Diluted Hydriodic Acid 1 by wt., Water 0·5, Syrup to 10. Contains 1% HI. U.S. is similar, containing 1·4%.

Glycerinum Acid Hydriodici.

Dose.—20 to 60 minims in Water, increased to three drachms.

Experiments which we have conducted show that dilute Hydriodic Acid 1, Glycerin 4½, and Water 4½, produce a glycerole with good keeping qualities. Contains 1% hydriodic acid.

✱ **Gardner's Syrup** "Hyodin," contains about 1¼% of Hydrogen Iodide. *Dose.*—1 to 3 drachms in water.

(✱ Gardner's Unalterable Syrup of Hydriodic Acid—a label is T.M. 28138).

Vapor Iodi Ætherealis.

Iodine 3 grains, Ether 2 drachms, Carbolic Acid 2 drachms, Creosote 1 drachm, Alcohol 90% 3 drachms. Ten minims to be used in an inhaler, *e.g.*, the 'Ozonic.' Thymol may be substituted for creosote.

Iohydrin—*Martindale.* **Di-iodo-isopropylalcohol, Glycerin Di-iodo-Hydrin.**

$CH_2I. CHOH. CH_2I$=311·903.

Dose.—By inunction ½ to 1 drachm weight suitably diluted in 25% or less Ointment. *Caution.—Is not given internally.*

A yellowish-oily liquid (Sp. Gr. 2·5) prepared by heating *s*-dichlorhydrin with potassium iodide solution. Contains about 80% iodine

Incompatible with water.

Soluble 1 in 75 of water. Being readily absorbed by the skin is employed for inunction of iodine in inflammatory conditions, scrofula, pulmonary tuberculosis, bronchial asthma, &c.

Unguentum Iohydrin 25% or less as ordered in Lanolin basis is the most suitable strength. It should not be applied to any delicate portion of the body—pure Iohydrin alone is caustic.

✱ **Sajodin** (T.M. 267913 and 322559). *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**) up to 90 grains per diem *after* meals.

The name given to the Calcium Salt of mono-Iodobehenic Acid $(C_{22}H_{42}O_2I)_2$ Ca=970·892. A tasteless powder containing about 26% Iodine and 4% Calcium, ***Insoluble*** in water, used in syphilis, bronchial asthma, arteriosclerosis, &c.—*See* B.M.J.E. ii./10,68.

Ferro-Sajodin Tablets.—7½ grains=0·12 Gm. Iodine and 0·028 Gm. Fe; *Dose.*—One tablet two or three times a day after meals.

Assumed to be Iron-Iodobehenate. Contains 24·5% Iodine and 5·6% Iron Substitute for Inorganic Iodine and Iron. In syphilis, anæmia, etc.

Di-iodo Elaidic Acids containing 45 to 47% Iodine are more suitable for use. Tasteless compounds insoluble in the acid secretion, but decomposed in the intestines.—P.J. i /11,175.

✱Sabromin (T.M. 322558). *Syn.* **Calcium Dibromobehenate** $(C_{22}H_{41}Br_2O_2)_2Ca = 1034{\cdot}626$.

Dose.—15 to 45 grains (**1 to 3 Gm.**) in powder or tablets (7½ grains). Contains 29% approx. Bromine. White powder insoluble in water and alcohol. An alkaline Bromide substitute stated to have less tendency to produce bromism, the absorption being slow.

It controls epilepsy without producing a rash.—P.M.C.E., C.D. ii./12,603.

✱Iodostarin (T.M. 318223). *Syn.* Di-Iodo-Taririnic Acid. $CH_3(CH_2)_{10}CI.CI(CH_2)_4COOH = 534{\cdot}186$.

Dose.—Tablets containing 3 grains—1 to 3 *per diem.*

Taririnic Acid occurs as its glyceride in the oil of the fruits of Picramia Sow or Tariri—a *Simaruba* found in Guatamala. Leaflets melting point 50·5° C. The formula given by Schmidt is $C_{18}H_{32}O_4$ not $C_{18}H_{34}O_2$ which the above compound would indicate.

Iodostarin contains 47·5% Iodine. It is a tasteless compound from which the Iodine is probably absorbed in passing through the intestine and hence as a succedaneum to the alkaline iodides, is used in syphilis, actinomycosis and arteriosclerosis. Consumption of Alcohol simultaneously is to be restricted as iodism may result.

IPECACUANHA.

(*In numerous Pharmacopœias.*)

Dose.—As an expectorant, ½ to 2 grains (**0·03 to 0·12 Gm.**), as an emetic 15 to 30 grains (**1 to 2 Gm.**).

The dried root of *Psychotria Ipecacuanha* (*Rubiaceæ*)* from **Rio De Janeiro**. A second variety is the Minas Ipecacuanha from Brazil. A third is Indian from the same plant, grown in Straits Settlements; another variety is known in commerce as **Carthagena Ipecacuanha.** It is thicker, the annulations less marked (taking the form of narrow merging ridges) and its starch-grains are somewhat larger; this is less expensive, and is not official.

Historical.—The Brazilian root was first brought to Europe in 1648 by Pison. It was subsequently given for dysentery, chiefly in small doses, by several Anglo-Indian physicians. In 1858 E. S. Docker, I.M.S., introduced large doses (60 grains two or three times daily) for severe dysentery in Mauritius.—B.M.J. i./12,1424. G. Foy points out that we are indebted to Dr. J. L. Bardsley, of Manchester (1829) for the empirical use of Emetine in dysentery. —L. ii./12,1242.

Flavoring of Liquid Ipecacuanha Preparations.—Syl Vanillæ, Syl Rosæ; Syrupus Aurantii.

Uses.—Expectorant, emetic. Loosens phlegm, *e.g.*, in bronchitis, whooping cough and croup. In small doses is stomachic and increases the flow of bile. Was employed in the de-emetinised form (**Pulvispecac Iuanhæ sine Emetina**, *dose* 5 to 20 grains) in dysentery, but recently emetine (*q.v.*)has been found to be virtually a specific for amœbic dysentery.† Frequent doses, 1 to 2 minims of the Wine of Ipecacuanha sometimes check sickness.

In anthrax has been employed successfully. The powdered root is dusted on the sores and 5 grain doses given every four hours.

For tropical liver abscess Ipecacuanha is specific. It cures the active or latent dysentery which has caused the suppurative hepatitis and prevents further breaking down of the liver substance.—B.M.J.ii./08, 1246. Large doses better than several small ones. Vomiting to be prevented by Chloral Hydrate and Liquor Morphinæ.—L. ii./08,484.

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* F.I. uses name *Uragoga Ipecacuanha.*—Baill.—P.G.V. has this.

† Chronic colitis and chronic dysentery may be quickly cured with the de-emetinised drug. Emetine kills amœbæ but Ipecacuanha contains other substances which kill other organisms.—H. Alston, B.M.J. ii./13,1380.

Dysentery and hepatitis, treatment of.—The patient should not eat or drink anything for two hours before and after the dose, but twenty minutes previously he should take 20 grains of chloral. The dose of Ipecacuanha is 30 grains for the first three or four nights, reduced to 25 and 20 gradually, a single dose daily being usually sufficient. When the leucocytosis has fallen to 10,000 or less, the temperature has become normal, and the discomfort in the region of the liver has disappeared, the drug may be continued for another week in doses of 20 grains daily. All patients who have had such an attack should abstain from alcohol so long as they reside in India. As a rule diffuse hepatitis precedes the formation of a liver abscess. In hospital practice, in which Ipecacuanha was systematically used, not a single case of dysentery was complicated by hepatitis.—B.M.J. ii./10,2039.

In ulcerative colitis not so useful as in dysentery.—Pr.Aug.'09,152.

Diarrhœa in the French Army well treated by 0·8 to 1 Gm. of thepowdered root, *p.d.*, divided into 5 or 6 doses of 0·2 Gm. Each dose is taken in a warm infusion every two hours. On the day of administration the patient is restricted to a liquid diet and milk is forbidden. The following day he may feed on solids again, with the exception of meat. The diarrhœa is not stopped on the actual day of administration, but ceases on the following day. No longer necessary to remove any patient from duty on account of diarrhœa, and he is not rendered unfit for duty for more than a day. The remedy is well tolerated; it sometimes gives rise to nausea, but rarely to vomiting.—Lehmann, L. ii./15,363.

Poisoning by. If taken in sufficiently large doses it is ***not*** its own antidote.—L. ii./08,536.

Off. requires not less than 2% Alkaloids. *For the methods of assay of Ipecacuanha and other chemical data see Vol. II.*

F.I. agreed the root bark only to be powdered, rejecting the woody portion. The powder should have an alkaloidal strength of 2%. Fr. Cx. also requires 2% alkaloids and directs it to be estimated for alkaloid on a sample powdered as directed under Poudre d'Ipecacuanha; powdering in a covered iron mortar and passing through a fine sieve to the extent of three-quarters of the weight of root taken.—*i.e.*, rejecting the woody portion.

U.S. allows both *Cephaelis Ipecacuanha* (*Rio*) and *C. acuminata* (*Carthagena*) if yielding 1·75% Ether soluble alkaloids.

Ⓟ**Tablets of Ipecacuanha Powder** contain $\frac{1}{20}$, $\frac{1}{10}$, $\frac{1}{4}$ and 5 grains. Ⓟ**Pills** have been prepared salol-coated with a view to their dissolving in the intestine only. '**Stearettes**' *q.v.* are preferable.

In the treatment of amœbiasis, an initial purgative such as Castor Oil is given, then after a three hours' fast in the evening 40 to 60 grains of Ipecacuanha in the form of Pills, Salol-coated have been recommended. The dose is then reduced 5 grains each evening until 10 grains is reached. This dose is continued each day for two weeks.—M.A. 1911.

Ⓟ ✱'**Membroids**' (T.M. 272337) (Animal Membrane Capsules for dissolving in the intestines) of Ipecacuanha, 5 and 10 grains are very useful in the treatment of dysentery.—L. ii./07,1591.

Membroids are also made of Blaud Pill = 1, 2, and 3 Pills, and **P1** with arsenic $\frac{1}{50}$ and $\frac{1}{100}$ grain, of creosote, 1, 2, 3 and 5 minims, and of quinine sulphate 1, 2, and 3 grains, and of santal oil 5, and 10 minims, also santal oil 8 minims, salol 2 grains and methylene blue 1 grain.

Ⓟ**Fluidextractum Ipecacuanhæ, U.S.** 1=1 by hydro-alcoholic percolation. Standardised to 2 Gm. (U.S. VIII. was 1·5) alkaloids in 100 Cc. *Average dose.*—Emetic, 15 minims; expectorant, 1 minim. P. Helv. has Liquid Extract containing 'at least 2% Emetine and Cephaeline.'

Ⓟ**Extractum Ipecacuanhæ,** Fr. Cx.—Extract the root with 70% Alcohol, and evaporate to firm extract.

Ⓟ An **Elixir** has been made with Liquid Extract 1, Alcohol 90% 1, Glycerin 5, Water to 20; may be dispensed with alkalis. *Dose.*—As expectorant, 10 to 30 minims.

Ⓟ**Linctus Glycerini, St. M.'s H.**

Ipecacuanha Wine 5 minims, Paregoric 15 minims, Glycerin $\frac{1}{2}$ drachm, Water to 1 drachm.

P1 **Pulvis Ipecacuanhæ Compositus.**

Syn. Dover's Powder. (*Off.* and B.P. 1898).

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Ipecacuanha 1, Opium 1, Potassium Sulphate 8. Is diaphoretic and anodyne; 10 grains at bedtime for an acute catarrh or coryza, followed at once by a hot drink and 5 grains of quinine next morning.—Tilley.

P1 **Poudre d'ipecacuanha opiacee.**—Fr. Cx. *Max. single dose* 15 grains. Max. during 24 hours 60 grains. Is the same but has Potassium Nitrate 4 and Potassium Sulphate 4, *vice* Potassium Sulphate 8.

P1 **Tablets** of Dover's Powder, 5 grains (**0·3 Gm.**).

For asthma in children.—The following mixture has been given instead of Dover's Powder:—

Tinctures of Aconite, Belladonna, Drosera, Grindelia and Lobelia of each 15 minims, Extract of Opium 8 grains. *Dose.*—5 to 10 drops in sweetened water.—Pr., June '12,890.

Ⓟ**Syrupus Ipecacuanhæ, P.G.V.; (F.I.)**

Ipecacuanha Tincture 1, Syrup 9.

Ⓟ**U.S.** orders Fluid extract 7, Acetic Acid 1, Glycerin 10, Sugar 70, Water to 100.

Fr. Cx. has 'Sirop' 1% of Extract made by dissolving Extract 1 in Alcohol 70% 3, and mixing with Syrup 100 intended as an emetic. That of F. I. is not emetic in usual doses.—Fr. Cx.

Ⓟ**Tinctura Ipecacuanhæ.**—Fr. Cx.; P.G.V. (standardised to at least 0·194% emetine = $C_{30}H_{44}O_4N_2$), **P. Belg.; P. Hung.**—10% prepared by percolation with Alcohol 70%—as required by F.I.

Ⓟ**Trochisci Ipecacuanhæ.**—$\frac{1}{4}$ grain (**0·015 Gm.**) in each, with Simple basis (*Off.*) or Fruit basis (B.P. '98).

Ⓟ**Trochisci Morphinæ et Emetin** (Trochisci Tussis) contain Morphine $\frac{1}{40}$ grain with Emetin $\frac{1}{80}$ grain. Useful in bronchial asthma.

Ⓟ**Unguentum Ipecacuanhæ et Crotonis.**—Sawyer.

Pulvis Ipecacuanhæ 1, Linimentum Crotonis 1, Adeps Benzoatus 2. A powerful counter-irritant, rubbed on the skin of epigastrium relieves gastralgia.

Ⓟ***Vinum Ipecacuanhæ** (*Off.* and B.P. 1898).

Dose.—As an expectorant, 10 to 30 minims (**0·6 to 2 Cc.**); as an emetic 4 to 6 drachms (**15 to 22 Cc.**).

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*Ⓟ Though probably not intended. This remark applies also to other preparations of Ipecacuanha.

B.P. uses Liquid Extract of Ipecacuanha 1 to Sherry 19. It is better, however, to prepare with detannated wine. Is given in 2 to 3 minim doses to allay the vomiting in pregnancy. U.S. has Fluid extract 1, Alcohol 1, White Wine 8.

Flavoring.—Syl Vanillæ, Syl Cinnamomi; Syrupus Tolutanus.

P1 **Emetina.** *Syn.* IPECINE.—$C_{29}H_{40}N_2O_4$ = 480·485.

This formula found by F. H. Carr and F. L. Pyman differs from O. Hesse's by CH_2.—his formula being $C_{30}H_{42}N_2O_4$.—Proc. Chem. Soc. 1913,226; P.J. i./14,754.

Emetine according to Pyman is the mono-methyl ester of Cephaëline. Hesse has withdrawn the above formula and now proposes $C_{30}H_{40}N_2O_5$.—B.M.J. ii./15,794.

The formula of Carr and Pyman as above stated has been confirmed by Karrer (1916), who also claims to have discovered independently the formation of Emetine by the methylation of cephaëline.—C.D. Apl. 28/17.

In the stable neutral salts the bases are combined with *two* equivalents of Acid. Basic Salts also exist. Both this alkaloid and cephaëline are lævo-rotatory.

A white powder darkening on exposure, sparingly soluble in water, ***soluble*** in ether, alcohol, and chloroform.

P1 **Emetine Hydrochloride** $C_{29}H_{40}N_2O_4 2HCl, 6H_2O$ = 661·517.

Dose.—$\frac{1}{100}$ to $\frac{1}{25}$ grain (**0·0006 to 0·0025 Gm.**) *per os* as an expectorant—a crystalline salt. As an emetic *per os* $\frac{1}{12}$ to $\frac{1}{6}$ grain (**0·005 to 0·01 Gm.**) has been given. ***Hypodermically*** in amœbic dysentery and hepatitis $\frac{1}{2}$ to $\frac{2}{3}$ grain. Rogers gives 1 grain of Emetine each day—in *two hypodermic doses* of $\frac{1}{2}$ grain each. *Amœbæ in the body* thought to be killed *in from two to four days.* —Sir C. P. Lukis, B.M.J. i./13,1357.

Cumulative Action.—Poisoning may result. Bad effects on kidneys and liver. Experiments made on cats hypodermically seem to show that $1\frac{1}{2}$ grains per day for man should not be exceeded.—H. H. Dale, B.M.J. ii./15,895.

Emetine Hydrochloride 0·12 Gm. intravenously or 1·8 Gm. hypodermically would probably be toxic to a man of 60 kilos. The maximum safe dose for man would be 0·06 Gm. intravenously or 1·2 Gm. subcutaneously. A total dose of Emetine hypodermically even if spread over several weeks is the limit of safety.—Dalimier, Presse Méd. per P.J. i./17,319.

INTRAMUSCULAR injection of Emetine found satisfactory. No pain or swelling.—P. Figdor, L. ii./17,258.

Intravenously $\frac{1}{2}$ grain to $\frac{2}{3}$ grain in 5 Cc. Normal Saline has been given—the best plan in desperate cases.—L. Rogers, Jl. Trop. Med. March 1, 1913, p. 74.

Soluble about 1 in 9 in water, but this is not permanent at 15·5° C.—it is safer to use 20 parts of water at least. Our experiments showed that the addition of a little Hydrochloric Acid throws out a gelatinous precipitate. The acid salt is known to be less soluble.

D. B. Dott confirms this solubility. The 1 in 9 Solution soon becomes cloudy from the formation of crystals. It required three more parts of water to render the salt completely soluble—the solubility cannot be stated until there has been ample time for the salt fully to crystallise.—P.J. ii./17,283.

Injections made with Distilled Water are less irritant than those made with Normal Saline. Solutions in sealed ampoules stand sterilising.—Y.B.P., 1919. p. 12.

Pharmacology of Emetine.—It depresses and may eventually paralyse the heart. It is a powerful gastro-intestinal irritant whether given *per os* or hypodermically. May be source of danger in pathogenic condition.—E. J. Pellini and G. B. Wallace. American Journal of Medical Science, Journal of American Med. Assn., 1916, *67*, 975 per P.J. ii./16,413.

DYSENTERY, TREATMENT OF, BY EMETINE INJECTION.

Leonard Rogers (Calcutta) determined experimentally that Emetine Hydrochloride, even in weak solution, destroys *amœba histolytica* in dysenteric stools. 1 in 100,000 rendered the organism inactive in a few minutes and apparently killed it. *Hypodermic* injections of this salt were most effectual. $\frac{1}{6}$ grain (= about 15 grains of Ipecacuanha) given as a trial in first case,—acute hæmorrhagic amœbic dysentery—with good result. Subsequently two doses of $\frac{1}{3}$ grain completely cured *without producing nausea or vomiting.* Two other cases—one chronic amœbic dysentery of 3½ years' standing and the other acute hepatitis both cured similarly. In the latter case several ½ grain doses were given. Temperature was promptly reduced. In all cases the giving of Ipecacuanha *per os* was impracticable.—B.M.J. i./12,1424.

Words can convey only a feeble impression of the rapidity and completeness in grave cases. Dosage in this series was in general 3 or 4 daily doses of between 1 and 2 grains, according to condition, for the *extremely acute* cases ; for chronic amœbic dysentery also for amœbic liver abscess ½ grain daily for three days.—B.M.J. ii./12,405. *See also* L. i./13,1546 ; L. i./14,1477.

J. A. Tull Walsh states he used Emetine in dysentery with good results prior to Rogers.—See I.M.G., Sept., 1891 ; L. ii./12,1179.

In Calcutta and in Bombay, in the damper parts of India, the amœbic variety of dysentery is the more prevalent. In children about 7, $\frac{1}{3}$ grain doses given successfully.—L. ii./12,1064.

The treatment removes the latent or active dysentery which has caused the suppurative hepatitis and prevents further breaking down of the liver substance.—L. ii./12,1161.

J. W. Lawson reports treatment of a case of dysentery acquired in the Boer War. Successful treatment.—B.M.J. ii./12,793.

A. Chauffard reported a case of dysenteric abscess opening into the bronchi in which rapid recovery took place. The patient, a healthy man, aged 21 years, contracted dysentery in August, 1911. There were 30 glairy and sanguineous stools daily, also enormous expectoration of chocolate coloured material. After treatment with Serum and Silver Nitrate enemata a temporary cure was effected with a relapse. The liver extended four finger-breadths below the ribs. There were dulness and absence of vocal fremitus and respiratory sounds at the base of the right lung. The leucocytes numbered 49,000, of which 77% were polynuclear. Examination showed an ulcer of the size of a 50 centime piece in the rectum. Under rest and enemata of Dermatol the condition improved slightly. Six subcutaneous injections of $\frac{2}{3}$ grain (0·04 Gm.) of Emetine were given. Each day after injection the expectoration fell, and lung condition improved. After the second injection the sputum became less hæmorrhagic and the temperature normal. The hepatic dome had regained its normal contour and the base of the lung was clear. In five days a hepato-bronchial fistula of five months duration was cured. The result said to be comparable with Quinine in malaria and Salvarsan in syphilis.—B.M.J. i./13,574 : L. i./13,1132,1546.

Amœbic dysentery of 3½ years duration cured. Effect said to be like passing suddenly from Hades to Olympus. Patient had been passing 20 to 30 stools a day. Specific in 36 hours.—L. i./13,1803.

Amœbic dysentery in Egypt treated by $\frac{1}{8}$ to 1 grain hypodermically

—majority received this amount thrice per week. Hæmorrhage ceased and pallor disappeared. One case of 4 years standing cured with 3 injections.—F. J. Harpur and W. B. Haddad, L. i./15,255.

Sir R. Ross on the treatment of dysentery. Past experience in India. Ipecacuanha given in massive doses. The first dose usually vomited but the drug tolerated on the second or third. Up to the present, the author states, he is not at all convinced that the drug is of no benefit in *bacillary* dysentery, also. In chronic dysentery the drug was given daily for some weeks. Enemata were used more certainly than in acute dysentery and Nitrate of Silver was a classical drug for the purpose.

Amœbæ may remain comparatively innocuous for a considerable time but all amœbæ and flagellates are potentially dangerous.

Emetine hypodermically probably brings the drug more directly into conflict with amœbæ at the bottom of the ulcers while ipecacuanha (*per os*) does more to attack amœbæ on the surface of the mucous membrane and in the lumen of the intestines. Probably the use of both at the proper stages is desirable. They are thought by many to be powerless against bacillary dysentery while the sulphates of magnesium and sodium (a treatment introduced by the French) are thought to be powerless against the amœbic form.

Experience among the troops—British, Colonial and Indian—showed that dysentery was not so prevalent among the latter, showing that a certain amount of immunity is no doubt acquired during childhood.

One grain of Emetine Hydrochloride was given as a general rule either in one subcutaneous injection or in two doses morning and evening, then given three days consecutively with the same period intermitted or 5 days on and 5 days off. One week's treatment generally efficacious.

A single lethal dose for man Rogers calculated is 15 grains.

As to the medicinal treatment of running acute dysentery failing a polyvalent serum heaped teaspoonsful of Bismuth Subnitrate are advised 3 or 4 times a day (Deeks treatment in Panama). Tannic Acid 10 grains is a useful addition.

To prevent hepatic abscesses which continue to appear for years after attacks continue Emetine periodically.—L. i./16,1.

In amœbic dysentery Emetine is very satisfactory. In some cases there was subsequent palpitation, breathlessness, arrhythmia and precordial pain. It was a question as to whether these effects were due to the acute infection, excessive smoking or the remedy Emetine (experimentally Emetine has been found to produce ventricular fibrillation.—Levy and Rowntree).—Surgeon-General H. D. Rolleston, B.M.J. i./17,225; L.i./17,258.

When Emetine fails in dysentery Decoction of *Simaruba Officinalis* in doses of 6 Gm. in 200 Cc. of water, a Wine made of seeds of *Brucea Sumatrana* or a Decoction of *Ailanthus glandulosa* recommended. *Locally* injections of Thymol 1 in 6000, Silver Nitrate 1 in 1000, Quinine 1 in 1000 advised. Copper Sulphate 1 in 2000, Tannin 1 in 500, Potassium Permanganate 1 in 4000 have also been tried but are of no effect.—Prof. V. Gabbi, L. i./16,523.

Peculiar effects may be produced. In two fatal cases there was inability to swallow after food had reached the œsophagus; hepatisation of the lungs and action on the heart.—Military Surgeon (American) 1917, *40*, 58.—Per P.J. i./17,139.

In acute dysentery irrigation of the large bowel with 0·5% Tannic Acid Solution often better than Emetine As enema in conjunction with Emetine treatment also useful. Tannin 4, Iodoform 3, Sodium Chloride 6, Arrowroot 25, water to 1000. To be given in two enemata in 24 hours. Must be kept in the large intestine for 15 to 20 minutes.—Prof. S. Kartulis, B.M.J. i./16,144.

Emetine does not kill the Cystic Stage of the Parasite.—It kills the amœbæ or active living forms which are present in the tissues of the bowel. The cysts in the fæces are being cast off and only indicate that there are living amœbæ in the bowel producing them. If all the amœbæ are killed, then there can be no further production of cysts; the stools become negative and remain so permanently.—G. C. Low, L. i./17,482.

The Relative Failure of Hypodermic Treatment with Emetine with dysentery carriers is probably to be explained by the entamœbæ being more or less shut off from the circulation and tissue fluids of the patient.

Small quantities (less than 10 grains in total) given hypodermically rarely rid a carrier of E. Histolytica of his infection.

Full courses of the drug (10—12 grains or more) are successful in about one third only of the cases treated.

Re-treatment with equal or larger amounts of the drug—of patients who have already received full courses, offers little hope of success.—Clifford Dobell in Special Report on Dysentery issued by Med. Res. Com. under Nat Health Ins. (H.M. Stationery Office), 1917.

Liver abscess in India well treated. The temperature 101° to 103°. Expectoration (containing typical liver pus) was 2½ pints in the 24 hours. Within 3 days the temperature was normal, and the amount of expectoration was only half a pint. Convalescence rapid, and there has been no relapse. Nine injections were given and acted like a charm.—F. J. W. Porter, B.M.J. i./13,1036.

Liver abscess treated with Emetine and irrigation with Iodine Lotion (Tincture of Iodine 1 drachm, Normal Saline 1 pint) and 4 ounces of Quinine Bi-Hydrochloride Solution (10 grains to the ounce). *P.m.*, it was found the effect of Emetine was cicatrizing in addition to being specific. In 98% of liver abscess in the Tropics amœbic dysentery is the cause. Rogers' method of dealing with liver abscess is as follows :—Aspirate, injection of Emetine Hydrochloride 1 grain to 1 ounce of Water before withdrawing the cannula, seal puncture with Collodion and repeat on a further occasion if required. —B.M.J. ii./13,1058.

As diagnostic. If no response within three days, the case is not amœbic dysentery.—B.M.J. i./13,1358.

Liver abscess in the Federated Malay States treated by 1½ grains hypodermically daily after successful surgical evacuation.—C.B. Pasley, L. i./15,1076.

Hæmoptysis.—As Emetine causes prompt disappearance of blood from the stools in amœbic dysentery, trials of the drug in tubercular hæmoptysis were made and found satisfactory. 1 Cc. of water containing 3/5 grain (0·04 Gm.) Emetine injected into the thigh, hæmorrhage from the lung ceased at once. Successful when all other methods failed.—Press Med. April 16/13, Sept. 24/13 ; P.J. i./13,753 ; ii./13,808.

The treatment relieves congestive conditions of the lung generally. Cardiac debility must be alleviated by other means first.—See also B.M.J. i./14,703 ; and Aubert Bouger and Chauffard, Bull. de l'Acad. de Med., Jan. 20, 1914 ; P.J. i./14,662.

Sprue treated by Emetine hypodermically and Vaccines.—L. Rogers, L. i./14,1605.

Cholera well treated by hypodermic doses of 0·01 to 0·04 Gm., combined with Camphor injections and Saline.—Renault, I.M.G., July, 1914.271.

Hæmorrhage of the digestive tract in diabetes has been arrested by 1 grain doses hypodermically.—Renon, Le Concours Médical.

Pyorrhœa has been treated by Smith and Barett by local application of ½% solution in the hope of destroying Entamœba buccalis the organism thought to be responsible. In addition ⅛ grain hypodermically daily for 8 days or a dose of ½ grain the first day and then after interval of a day ¼ grain on two successive days. A few drops of Liquid Extract of Ipecacuanha on the tooth brush as a routine measure might be useful—even as a prophylactic, or the following mouth-wash or pigment :

P1 **Pigmentum Ipecacuanhæ et Arsenici.**
Ipecacuanha Wine ½ ounce, Glycerin 1 drachm, Liquor Arsenicalis to 1 ounce. *Caution Poison !*—F. B. Bowman, B.M.J. i./16,373. See also Sir L. Rogers, Ind. Med. Gaz., April, 1915.

Good result from a mouth wash of Emetine Hydrochloride ½ grain in water 8 ounces.—B.M.J. ii./18,188.

Typhoid has been treated by Emetine ½ grain hypodermically given as early as possible and repeated every 6, 8 or 12 hours till maximum afternoon temperature is within 1 to 1·5° of normal after which ½ doses until normal. Should not be used as an abortant after the third week of the disease except in very small doses as serious hæmorrhage is likely to be produced.—W. L. Frazier, Med. Rec., March 20th, 1915. See also note under Stearettes of Emetine-Bismuth-Iodide.

For Method of Searching Stools and Mucus for Amœbæ, see Dysentery, *Vol. II.*

Ⓟ **'Sterules' of Emetine Hydrochloride** are prepared ¼ grain (0·016 Gm.), ⅓ grain (0·02 Gm.), ½ grain (0·03 Gm.), in 15 minims (1 Cc.).

Ⓟ **Emetine Stearettes** 1/3 grain. Emetine *per os* in amœbic dysentery gives good effect but not so rapid as hypodermically.

1/3 to 2/3 grains may be given without exciting any great nausea. —Sir C. P. Lukis, B.M.J. i./13,1357. The Stearettes are especially protected from the action of the gastric juice.

Ⓟ **Emetine Hydrobromide.**—$C_{29}H_{40}N_2O_4 2HBr,4H_2O$ = 714·405.
Dose—as for Hydrochloride.

White crystalline salt. *Soluble* about 1 in 50 only of water, hence the Hydrochloride should be prescribed in preference. The addition of a little Hydrobromic Acid does not increase or decrease solubility.

Ⓟ **Sterules of Emetine Hydrobromide,** ¼ grain in 15 minims (1 Cc.) and ½ grain in 30 minims (2 Cc.) are prepared.

Ⓟ **Vinum Emetinæ,** 4 grains of the Hydrochloride in 8 ounces of Sherry. Equivalent to Ipecacuanha Wine. *Dose.*—5 to 45 minims (0·3 to 3 Cc.).

P1 **Emetine-Bismuth-Iodide.** $C_{29}H_{40}N_2O_4.2HI.BiI_3.H_2O(?)$ = 1343·117
Dose.—Three grains (0·2 Gm.) (= approximately 1 grain (0·06 Gm.) of Emetine, or about 60 grains of Ipecacuanha) constitutes the average daily dose given after a full meal or last thing at night. Twelve doses are given in succession to make up the course. A less quantity, it is stated, may only lead to a relapse. A total of 60 to 70 grains (4 to 4·6 Gm.) may be necessary in some cases.

A brick-red powder containing approximately 30% Emetine. (1 Gm. Emetine-Bismuth-Iodide = 0·4 Gm. nearly Emetine Hydrochloride $C_{29}H_{40}N_2O_4$, 2HCl, $6H_2O$.)

Manufacture.—Solve Emetine Hydrochloride 660 Gm. in water 32,000 Cc. and treat with excess of the following solution :— Bismuth Carbonate 290 Gm., Potassium Iodide 920 Gm., Concentrated Hydrochloric Acid 900 Cc. or *q.s.* to clear and water 16,000 Cc. Collect precipitate, wash and dry at 40° C.

The formula we give for the compound indicates 35·7% of Emetine, but the substance is not a very definite compound—there is chance of loss of Emetine in the washing.

We had occasion to examine numerous commercial samples of the compound and the results were so variable that we suspected that some of them were prepared by precipitating an Acid Extractive of Ipecacuanha without previously isolating and purifying the Emetine! A standard of 29% Emetine is required.

Examination of Commercial Samples of Emetine-Bismuth-Iodide.

	Appearance.	Content and condition of alkaloid extracted.	Iodine content.
1.	Color reddish yellow	Alkaloid 42%. Dark and resinous. One-third can be extracted by chloroform from acid solution.	36·2%
2.	Color bright orange	Alkaloid 40%. Dark color. One-fifth extracted by chloroform from acid solution.	35·6%
3.	Color good red	Alkaloid 31%. Light in color. One-twelfth only extracted by chloroform from acid solution.	41·9%
4.	Color good red	Alkaloid 29%. Light color. One-seventh extracted by chloroform from acid solution.	39·4%
5.	Color good red	Alkaloid 28·6%. Very light color.	42·4%

Solubilities.—Emetine - Bismuth - Iodide has been thought to be insoluble in dilute Hydrochloric Acid, but this view requires altering in the light of our experiments as follows:—

Emetine-Bismuth-Iodide 0·1 Gm. was elutriated with successive 10 Cc. quantities of 0·2% Hydrochloric Acid. The filtrate gave indication of Emetine with the usual reagents (Mayer's, Dragendorff's, Picric Acid, Gold and Platinic Chlorides). By this process in fact *all the Emetine* could be extracted.

Further, Emetine-Bismuth-Iodide 0·1 Gm. shaken with 200 Cc. of 0·2% Hydrochloric Acid will form an opalescent liquid (= 1 of Emetine-Bismuth Iodide in 2,000) containing the Bismuth in the form of oxychloride and the *Emetine in solution.*

In *concentrated* Hydrochloric Acid (*Off.*) it is soluble in 150 approximately.

This is not surprising but the solubility in *Physiological Acid* completely upsets the theory under which the compound was introduced.

The experiments show that a dose of Emetine-Bismuth-Iodide *unless properly protected* with Stearette or Salol coating is liable to be dissolved to a great extent in the stomach. Dr. Dobell agrees with us that the compound given uncoated is certainly to some extent absorbed in the stomach. He has found Keratin coating very uncertain.

In the presence of *alkali* the compound is readily decomposed. For example, 0·1 Gm. triturated with a few Cc. of 1% Sodium Bicarbonate solution quickly loses the red colour forming an opalescent white liquid.

Administration.—Preferably as "Stearettes" or Salol-coated Pills or hard gelatin capsules or cachets. (Keratin coating is of little use.)

Uses.—Similar to those of Emetine hypodermically. In particular it has been given for treatment of *Entamœba Histolytica* infected patients. It is effective in removing cysts of this *amœba* from the fæces of chronic carriers, whilst treatment with Emetine hypodermically has in many cases been followed merely by an early recurrence of cyst-passing. Such cases are clearly a danger to themselves and others.

The Medical Research Committee (National Health Insurance)

Report on Investigation of Dysentery Cases, issued 1917, states as follows :—

(1) Emetine-Bismuth-Iodide has cured the majority of carriers.
(2) In acute dysentery results are very satisfactory. Further trials are however, necessary.
(3) Large quantities essential—not less than 36 to 40 grains in daily doses of 3 to 4 grains.
(4) Given in this form Emetine has generally been successful even after hypodermic treatment has proved a failure.

Physiological Trials.—Cats weighing up to 3 kilos could take repeated doses of 40 milligrammes without vomiting. 60 milligrammes produced vomiting.—H. H. Dale, L. ii./16,184. The action varies remarkably with different animals.—C. Dobell.

There seems a strong probability that the activity of the substance is upon the patient rather than on the amœbæ—causing him to become resistant in an unexplained manner.

Du Mez, Philippine Journal of Science (B.) X., p. 73, 1915, suggested the compound as suitable for use *per os*. Results were "promising"—six weeks absence of cysts (daily examination) after Emetine hypodermically had failed but in some cases there was trouble through vomiting. A fresh case of acute dysentery treated with daily doses of 3 grains with results apparently as good as those with Emetine hypodermically. Prophylactic use worthy of consideration. But prior to this Major Warden and Col. Walsh in 1891 employed a compound of this kind and showed that a double iodide with mercury could be effectively given by the mouth.—*Vide* H. H. Dale, L. ii./16,184; i./17,780.

The first cases treated that we heard of (from Capt. Armitage, R.A.M.C.) were 200 among New Zealanders at Brockenhurst Military Hospital. Our information at that time (quite early in the war) was that cases which had *relapsed* owing to insufficient *Emetine hypodermically* received 3 grains per diem *per os* of the Bismuth Compound for 12 days (only to be given when the stomach juice contained as large an amount of acid as possible to prevent solution in the stomach and hence obviate vomiting). Cures were said to be "good."

Three cases with tabulated results of examination of stools *for E. Histolytica* and cysts show remarkably the efficacy of the powder. In one case (7 years standing) there was evidence of a resistant strain of Entamœba. Sickness is common. Many patients feel distinctly unwell while others are purged. More efficacious than Emetine Hydrochloride hypodermically.—G. C. Low and Clifford Dobell, L. ii./16,319.

Histolytica-infected patients treated with the compound in comparison with Emetine Hydrochloride hypodermically. Given *per os* on a full stomach in cachet. 1 grain thrice daily until 36 grains are given. The results surpassed the most sanguine expectations. Specific. Cysts and *amœbæ* vanished from fæces. No relapses; whereas with Emetine Hydrochloride there were 17 relapses out of 24 cases treated. It is harmless to the other protozoa of the human bowel.—C. Dobell, B.M.J. ii./16,612,626.

From the epidemiological as well as the medical standpoint this destruction of the encysted stage of the entamœba is of paramount importance. Hypodermic use of Emetine does not effect this. Its failure may be due to the presence of the entamœba in a healed pocket or sinus. Six cases treated of known carriers, four of which had previously had emetine hypodermically, gave good results. Best given at 10 p.m. Five of the cases ceased to pass amœbæ either in the active or encysted form 48 hours after starting the treatment.—C. G. Imrie, and W. Roche.—L. i./17,17.

Among convalescents returning from the Mediterranean area the proportion of "carriers" was 18 to 25%. Exceptionally it may be effective in *Entamœba Coli* infection.—C. Dobell. Medical Research Committee Report issued as a pamphlet under National Health Insurance (H.M. Stationery Office). For brief abstract see B.M.J. i./17,127.

Eight or nine doses instead of 12 three grains probably effective.—W. Waddell and co-workers.—L. ii./17,73.

"Carriers" cured—95% of cases. The loose powder in cachets preferred.—M. W. Jepps and J. C. Meakins, B.M.J. ii./17,645.

Emetine Diarrhœa.—Within limits this can be aimed at—it was aimed at in the old Ipecac. treatment The bowel is thoroughly washed out—in addition to the specific effect. A few days after the course (12 doses) the stools become normal.—G. C. Low. B.M.J. ii./17,484.

Ⓟ **'Stearettes' of Emetine-Bismuth-Iodide** 1 grain (0·06 Gm.), 2 grain (0·12 Gm.) and 3 grain (0·2 Gm.) are manufactured. The "Stearette" coating is described in the chapter on Pills.

Tablets so coated will pass intact through the stomach and dissolve on reaching the alkaline juices of the duodenum and intestines providing the alkalinity and bile secretion be adequate to effect the chemical reaction necessary. We proved some years ago that Keratin coating is practically useless.

Salol Coating has been recommended for Emetine-Bismuth-Iodide **Pills.**

We have examined Pills coated in this manner by placing them first in an acid fluid resembling the stomach digestive fluid and after 3 to 4 hours transferring them to alkaline digesting fluid containing bile. The results were satisfactory—the pills disintegrated in the latter.

Salol coating is, however, not always successful in such cases—this is probably due to a deranged digestive function. If there is a complete absence of alkalinity in the bowel digestive fluid (with lack of bile secretion), Salol would be useless. Note the following:—

Typhoid was treated by Salol-coated capsules of Ipecacuanha some years ago (see Pres. 1912, p. 52). The disease was aborted, but the Salol coating on the capsules burst before reaching the intestine causing vomiting, while at other times the capsules were passed entire and unchanged.

Vomiting caused by Emetine-Bismuth-Iodide can be reduced by giving in pills coated with salol.—G. C. Low, B.M.J. i./17,738; L. i./17,482. See also D. G. Lillie and S. Shepheard, L. ii./17,418.

Major C. D. Roe, D.S.O., 4th Gurkhas, Bakloh, Punjab, India, states (12/7/17) he was completely cured of Entamœba Histolytica dysentery (contracted in the Dardanelles) by Stearettes of Emetine-Bismuth-Iodide.

Combined Treatment by Emetine Hydrochloride 1 grain hypodermically for 5 days and three grain Salol-coated Emetine-Bismuth-Iodide pills daily for 12 days successful. Dilute Hydrocyanic Acid given to check vomiting.—H. L. Watson-Wemyss and T. Bentham, L. i./18,403. See also A. C. Lambert, B.M.J. i./18,116.

Methyl-psychotrine 0·015 to 0·033% and *Emetamine* 0·002 to 0·006%, two new alkaloids in Ipecacuanha, isolated by F. L. Pyman, P.J. i./17,360; C.D. Apl. 28/17. The former has no effect on *E. Histolytica* nor *Lamblia* infections. —M. W. Jepps & J. C. Meakins, B.M.J. ii./17,645.

P1 **Cephaëline.** $C_{28}H_{38}N_2O_4 = 466·464$.

(This formula of Hesse has been recently confirmed.—P.J. i./14,754, and the formula may be regarded as established.—B.M.J. ii./15,794.)

By Methylation it is converted into Emetine.—Carr & Pyman, P.J. i./17, 360; C.D. Apl. 28/17.

A crystalline alkaloid less soluble in ether than emetine, but soluble in caustic alkaline solutions, and also darkens on exposure.

The expectorant and emetic properties of **Cephaëline** and **Emetine** only result when administered *per os* and in large dose.

P1 **Cephaëline Hydrochloride,** $C_{28}H_{38}N_2O_4 2HCl = 539·40$.

Is the more powerful emetic in doses of $\frac{1}{12}$ to $\frac{1}{6}$ gr. and emetine the best expectorant.

Emetine and Cephaeline in phthisis, compared.—B.M.J.E. i./05,19.

Ⓟ **Emetin—Extractive.**

Dose.—Expectorant $\frac{1}{16}$ to $\frac{1}{10}$ (0·004 to 0·006 Gm.) emetic $\frac{1}{2}$ to

1 grain (0·03 to 0·06 Gm.), in pill or solution. An extractive substance soluble in water; must be distinguished from Emetine.

✱**Alcresta** (T.M. 368822) **Tablets of Ipecacuanha** (stated to be subject of a patent by Dr. Lloyd, of Cincinnati, but the No. 450204/1912 on the package is incorrect).

Dose.—Each tablet contains the alkaloids (emetine and cephaëline) from ten grains of Ipecacuanha, U.S.P. Ten or twenty tablets, representing one hundred or two hundred grains of ipecacuanha may be given in a day without vomiting or nausea.

The alkaloids of the drug are held in an adsorption by hydrated aluminium silicate. The tablets disintegrate but this adsorption compound, it is thought, passes through the stomach and releases the alkaloids only in the alkaline intestinal secretions—thus preventing vomiting.

For use in dysentery and endamœbic pyorrhœa.

The efficiency of this preparation was carefully tested at the Liverpoo School of Tropical Medicine—37·5% of the cases were unsuccessful—*i.e.*, patient continued to pass cysts during and after treatment or relapsed after treatment ceased.—See Ann. Tropical Medicine & Parasitology.—Vol. XI. No. 1, June, 1917.

IXORA COCCINEA. *Syn.* Flame Tree.

Dose of the powdered drug.—30 to 45 grains (2 to 3 Gm.) with aromatics every three or four hours. Taste not disagreeable.

A branching shrub growing throughout Bengal, Southern and Western India, N.O. *Rubiaceæ.*

The root contains a large amount of acrid Tannin, Saccharine matter, a large amount of fixed and small quantity of volatile oil. It contains no alkaloid.

The tannin, it is stated, does not coagulate gelatin and is only slowly neutralised by alkalis, hence it is capable of exercising its astringent effects over the lower parts of the small intestines and the large intestines. The aromatic acrid principles being easily diffusible exercise a more or less carminative action, but the drug practically in no cases produced marked constipation.

Uses.—It appears to possess some intestinal antiseptic and cholagogue property both of which are associated with an alterative effect on the intestines.

In acute and chronic diarrhœas, in dysentery (acute or chronic), in sprue it is recommended, but from lengthy reports it is clear it is not a panacea. It is stated that it is "no use playing with a small dose." Some of the opinions are favourable, others not so in comparison with Ipecacuanha. We suggest it is worthy of trial. —From Third Report of the Indigenous Drugs Committee, Calcutta, 1916, p. 23 *et seq.*; also p. 333 *et seq.* See also Dict. Economic Products of India I., 513.

Tinctura Ixoræ. *Dose.*—1 to 1½ drachms in water twice or thrice daily as tolerated, increased if necessary 1 in 5 of alcohol 60%.

Mistura Ixoræ. *Dose.*—One ounce thrice daily as tolerated, increased if necessary.

Tincture of Ixora 1 ounce, Peppermint Water to 8 ounces.

JABORANDI FOLIA.

Pilocarpus, U.S. Fr. Cx.

Dose.—5 to 60 grains (0·3 to 4 Gm.) of powder. *Average.*—U.S. 30 grains.

Fr. Cx. Max. *single dose* 45 grains, max. during 24 hours 45 grains.

The dried leaflets of a shrub. The variety known as *Pilocarpus* *microphyllus* or Maranham Jaborandi is mostly employed. Jaborandi was introduced into Britain by the late W. Martindale. Contains Pilocarpine up to 0·5% (U.S. not less than 0·6%). There are numerous other varieties.

For details of these and Assay of Leaves, see Vol. II.

Uses.—A powerful sudorific and sialogogue; after a time a large dose acts as an emetic, contracts the pupil of the eye, and causes approximation of vision. These properties are principally due to **Pilocarpine** contained in it. For other constituents, *vide Vol. II.*

The sweating and salivation from a full dose persist from 2 to 4 or 5 hours, the symptoms come on in about 10 minutes after taking the dose if external conditions are favourable. Hypodermically the alkaloid acts in 3 to 5 minutes. A reduction of temperature on an average of 0·9° F. occurs under the drug.

Jaborandi and pilocarpine have been used in a great variety of diseases, most successfully in asthma, diabetes, dropsy and uræmia, and as antidotes to belladonna and opium poisoning. Children proportionately are not affected by the drugs so much as adults. Externally promotes growth of the hair, *e.g.*, in alopecia.

Description and physiological action (on the writer).—P.J.1874,364.

Pilocarpine salts applied to the eye contract the pupil. Large doses are valuable in Bright's disease; small ones ($\frac{1}{20}$ grain) check night sweating of phthisis and do not over-dry the skin.

Puerperal convulsions have been treated by injection of solutions.

Pilocarpine has been found to relieve nerve deafness, also itching of jaundice and assists passage of gallstones.

Pneumonia is treated by hypodermic injections of $\frac{1}{10}$ gr. and more.

As a sialogogue, but requires care in administering.—L. i./06,903.

In alopecia $\frac{1}{6}$ grain of the nitrate increased to $\frac{1}{3}$ grain injected into the scalp made hair grow.—C.D. i./08,150.

In tinnitus aurium (acute labyrinthine) Pilocarpine hypodermically is of value in suitable cases.—B.M.J. ii./09,1131.

Obstructive forms of laryngitis occurring any time during measles are well treated with 1 mgr. injections of Pilocarpine (salt) repeated as required.—B.M.J.E. ii./08,84.

Pilocarpine which causes marked activity of most other glands has no effect on the secretion of the mammary gland.—K. Mackenzie, Jl. Exp. Physiology, Dec. 1911; see also Pituitary Extract.

Antidotes to Jaborandi and its preparations:—

After evacuating the stomach, give Tannic or Gallic Acid, then Atropine Sulphate or Tincture of Belladonna; *vide* also Poisons and Antidotes.

Strangury may be caused by Pilocarpine if given in too large a dose.

Ⓟ**Extractum Jaborandi Liquidum** (B.P. 1898), *Syn.* **Liquor Jaborandi.** 1=1 of leaves; in 45% Alcohol.

Dose.—5 to 15 minims (0·3 to 1 Cc.).

Ⓟ**Fluidextractum Pilocarpi, U.S.** 1=1 of leaves by diluted Alcohol. 0·6% Alkaloids. *Average dose.*—30 minims.

Ⓟ**Tinctura Jaborandi** (B.P. 1898). 1 in 5 of 45% Alcohol.
Dose.—30 to 60 minims (2 to 4 Cc.).

Fr. Cx. 1 in 5 by weight, Alcohol 60%. *Max. single dose.*—$\frac{1}{2}$ ounce approximately. Maximum during 24 hours the same.

Ⓟ**Linimentum Jaborandi.**

Jaborandi Tincture 1, Cantharides Tincture 1, Soap Liniment 4. For hair falling off, to apply with friction.—B.M.J.E. ii./09.24.

$\boxed{\text{P1}}$ **Pilocarpina,** $C_{11}H_{16}O_2N_2=208{\cdot}203$. Fr. Cx. The pure alkaloid is a colourless syrupy dextrorotary liquid.

Uses of Pilocarpine and its Salts. *See* Jaborandi *antea.*

$\boxed{\text{P1}}$ **Pilocarpinæ Hydrochloridum,** P.G.V., U.S., Fr. Cx.
$C_{11}H_{16}O_2N_2HCl = 244{\cdot}671$.

Dose.—$\frac{1}{20}$ to $\frac{1}{3}$ grain (0·003 to 0·02 Gm.) by mouth or hypodermically. In minute granular snow-white crystals, slightly deliquescent and very soluble in water. M.pt. between 195 and 199° C.

Uses.—*Vide antea.*

In pneumonia 20 minims of 1% solution on sugar or in water have been given. In hiccough ten minims every three hours is said to be useful.

Ⓟ**Hypodermic Tablets** contain $\frac{1}{6}$ grain

$\boxed{\text{P1}}$ **Pilocarpinæ Nitras.**
$C_{11}H_{16}O_2N_2.HNO_3 = 271{\cdot}221$.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain (0·003 to 0·012 Gm.). Fr. Cx.: *Max. single dose* $\frac{1}{3}$ grain approx.

In minute white granular snow-like crystals, but may be obtained in large white prismatic crystals. *Soluble* 1 in 8·2 of water, but very slightly in cold alcohol. This salt, preferred in England, was the first pure preparation of Pilocarpine prepared,—it was obtained by the late W. Martindale from an alcoholic solution.

The $\boxed{\text{P1}}$ **Phenate** and **Salicylate** have similar dose and properties.

Ⓟ**Tablets** of Pilocarpine Nitrate $\frac{1}{10}$ and $\frac{1}{5}$ grain to be given *per os.*

Ⓟ**Guttæ Pilocarpinæ Nitratis** 0·5 or 1%. **R.O.H.**

Used to contract the pupil of the eye. Ⓟ'**Sterules**' are prepared.

Ⓟ**Injectio Pilocarpinæ Nitratis Hypodermica R.O.H.**

Dose.—2 to 6 minims.

Pilocarpine Nitrate 1, Distilled water 20.

G.H. has the following. 'Remove the patient's night-shirt, wrap closely in a warm blanket, and cover with two more blankets. Put hot water bottles to his feet, and give hot drinks freely. After sweating has ceased, remove blankets gradually, dry the skin and leave him between warm dry blankets.'

Ⓟ**Hypodermic Tablets,** $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{2}$ grain (0·006, 0·008, 0·01, 0·016, 0·02 and 0·03 Gm.).

Ⓟ**Sterules, Hypodermic,** $\frac{1}{10}$, $\frac{1}{4}$, $\frac{1}{2}$ grain.

Ⓟ**Ophthalmic Discs,** $\frac{1}{500}$ grain, combined with gelatin.

Ⓟ**Lotio Pilocarpinæ,** for the hair.

Pilocarpine Nitrate 2 grains, Quinine Hydrochloride 8 grains, Glycerin 2 drachms, Rose Water 6 drachms. If *so ordered,* Cantharides Tincture 1 drachm may be usefully combined with above quantities. Applied locally, and used internally or hypodermically, Pilocarpine seems to have an action in promoting the growth of hair in alopecia or dandruff. Used also in Ⓟ **Ointment**, 4 grains to the ounce of a mixture of wool fat and soft paraffin ointment.

Ⓟ **Granular Effervescent Pilocarpine Nitrate.**

Dose.—1 drachm containing $\frac{1}{10}$ grain for use in throat affections.

Ⓟ **Bromocarpin.** *Syn.* SYRUPUS PILOCARPINÆ ET POTASSII BROMIDI.

Dose.—For children 3 to 7 years of age 1 to 3 drachms daily; 7 to 15 years 1 to 6 drachms daily; adults $\frac{1}{2}$ to 1 ounce daily, *all spread over the day.* To be taken before meals.

Stated to have the composition Potassium Bromide 10, Pilocarpine Hydrobromide 0·005, Orange Syrup and Glycerin *q.s.* to 100. See also B.M.J. i./12,1082—*by weight.* In epilepsy and nervous affections.

JALAPA.

Syn. BRYONE OR MÉCHOACAN NOIR.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.). The dried tubercules of *Ipomœa Purga* (*Off.*). *U.S. Exogonium Purga* (*Convolvulaceæ*).

Uses.—A powerful purgative producing watery stools, is apt to gripe; must be avoided if the bowels are inflamed. Used to reduce dropsy of Bright's disease, and to relieve uræmia. The **Extract** (*Dose.*—2 to 8 grains), **Resin** and **Tincture** are mostly used.

Tinctura Jalapæ Composita. (*Off.*). *Dose.*—$\frac{1}{2}$ to 1 drachm. Contains 8% Jalap with Scammony Resin and Turpeth.

Jalapæ Resin, P.G.V. and U.S.

Dose.—2 to 5 grains (0·12 to 0.3 Gm.).

Contains two glucosidal resins, about 90% Convolvulin (*Syn.* JALAPURGIN), $C_{31}H_{50}O_{16}$ = 678·555, soluble in alcohol but insoluble in ether, [this should be termed JALAPIN, as understood in England, (*dose* 1 to 5 grains)], together with about 10% Jalapin (Mayer), (*Syn.* ORIZABIN), $C_{34}H_{56}O_{16}$ = 720·618, soluble in ether and in alcohol. The latter, the principal constituent of spurious Jalap (*Ipomœa simulans* and *I. orizabensis*), is identical with **Scammonin** (*dose,* 1 to 5 grains) from scammony root, *Convulvulus Scammonia* (*Convolvulaceæ*). It is cheaper and less active.

The average yield of resin is about 10%. FR. **Cx.** requires 7%. *Off.* requires to contain not more than 15% ether-soluble.

For further data on Jalap and Scammony Resin, see Vol. II.

Pulvis Jalapæ Compositus (*Off.*).

Dose.—10 to 60 grains (0·6 to 4 Gm.).

Contains 30% Jalap with Ginger and Acid Potassium Tartrate.

LAMELLÆ.

Ophthalmic Lamellæ or Discs (*c.f.* Index—Lamellæ—for the various medicaments employed) are prepared with Gelatin and a proportion of Glycerin. *Off.*—The discs are 3 m.m. ($\frac{1}{8}$ inch nearly) in diameter. Directions are given.

$\boxed{\text{P 1}}$ **Atropine Sulphate** *Off.* weigh $\frac{1}{50}$ grain = $\frac{1}{5000}$ grain in each.

$\boxed{\text{P 1}}$ **Cocaine Hydrochloride** *Off.* weigh $\frac{1}{20}$ grain = $\frac{1}{50}$ grain in each.

Ⓟ**Homatropine Hydrobromide** *Off.* weigh $\frac{1}{32}$ grain = $\frac{1}{100}$ grain in each. Ⓟ**Physostigmine Sulphate** *Off.* weigh $\frac{1}{50}$ grain = $\frac{1}{1000}$ grain in each.

Medicated Gelatin Lamels.—Thin pliable gelatin sheets of size 9 cm. by 6 cm., divided into 24 squares, each square representing a dose. The sheets are sterilised and will stand variations in climate.

Medicaments.—Acetyl-Salicylic Acid 2½ to 5 grains, Bismuth Subnitrate 2½ grains and upwards. Calomel 1 or 2 grains with or without a dose of aperient, Cascara Extract 2 grains, Chlorodyne 5 minims, Coca Extract ½ grain, Dover's Powder 5 grains, Easton's Syrup 30 minims, Ipecacuanha ¼ to 2 minims, Morphine Hydrochloride 1/6 grain, Phenacetin 3 grains, Podophylin 1/6 grain with 5 minims strong Tincture of Ginger, Quinine Sulphate 2 grains, Strong Tincture of Ginger 5 minims, Tincture of Opium 5 minims, Vegetable Aperient.—L. i./15,283. Several of these are *poisons* in the meaning of the Act.

LECITHIN, OVO-LECITHIN.

$C_{42}H_{84}NPO_9$(?) = 777·932.

Choline Di-Stearo-Glycerophosphate.

Dose.—Internally 3 to 5 grains (0·2 to 0·3 Gm.) preferably half an hour before meals, *vide* Emulsion. This dose may well be increased if it is digested, as an average egg contains 16 grains approx.

Subcutaneously ¾ to 2 grains (0·05 to 0·12 Gm.) in sterile olive oil every second day.

Manufacture.—It should be prepared from egg yolks by alcohol extraction—*strong* alcohol is necessary.

For the Chemistry of Lecithin and its examination, vide Vol. II.

A yellowish wax like mass. It is a constituent of the brain 11%, and of yolk of egg 7%; milk, human, cows', etc., contains varying amounts, *c.f.* Vol. II.

An average egg weighing about 50 Gm., of which 30% or 15 Gm. is yolk, is capable of yielding 1·08 Gm. (16 grains) of Lecithin. The dose of Lecithin being 3 to 5 grains thrice daily, *i.e.*, 15 grains as maximum per day, is just short of that contained in a single egg. Lecithin is a drug rather than a food, though its presence in some foods possesses a singular influence on the growing organism.—L. i./13,842.

Lecithin is broken up by the pancreatic juice into Glycerophosphoric Acid, fatty acids and choline,—the last substance if absorbed in quantity might well induce toxic effects, but bacterial enzymes break up Choline into CO_2, Marsh Gas and Ammonia and thus the organism is protected.—L. i./13,1295.

Soluble 1 in 30 of 90% Alcohol, Ether 1 in 5, Chloroform (particularly), Carbon Bisulphide, Benzol and fatty oils. Swells up with water forming a kind of Colloidal Solution.

Flavoring.—Prescribed as Elixir or Emulsion *q.v.*

Uses.—Where the phosphates excreted by the urine are high. Given in neurasthenia, various nervous diseases, diabetes, tuberculosis, tabes and general paralysis; also in all diseases producing a disturbance of nutrition. It is said to cause a marked increase in patient's weight, and to improve the general well-being; augments the blood corpuscles. Rickets and marasmus have been successfully treated with lecithin, and intramuscular injections of Sterile Oil Solution have also given relief. Use suggested in incipient tuberculosis, osteomalacia, pernicious anæmia, and the like.

Has given good results in myasthenia gravis (Gowers).

Elixir Lecithin. *Dose.*—2 drachms containing 3 grains of Ovo-Lecithin, thrice daily after, or half an hour before meals, the latter in preference.

Emulsio Lecithin. *Dose.*—Half ounce, containing 5 grains of Ovo-Lecithin, thrice daily, as the Elixir.

Diabetes has been treated with marked results. Ovo-Lecithin should be taken in a fluid form half an hour before meals on an empty stomach. Absorption thus by the system takes place more readily. No very hot fluids should be drunk for some time afterwards, so that the composition of Lecithin may remain unaltered.

In menorrhagia 1½ to 3 grains thrice daily between the periods have converted a fortnightly menstruation to a normal one, or if period of usual length but too profuse, also useful. Must be given during the intermenstrual period, and continued some time.—B.M.J.E.ii./09,51.

Sterules for Intramuscular Injection. *Dose.*—1 Cc., equivalent to ¾ grain (**0·05 Gm.**) of **Lecithin** (prepared with oil). Also Ⓟ with Strychnine $\frac{1}{120}$, and $\boxed{\text{P1}}$ $\frac{1}{30}$ grain with **Guaiacol** (oil solution) ¾ grain.

Capsules, Pills and **Tablets** contain 1½ grains (0·1 Gm.). **Tabellæ** of chocolate basis contain ½ grain.

Is contained in **Pilula Potentin Composita**, *q.v.*

Ⓟ ✱ **"Byno"** (T.M. 215670)-**Lecithin.** *Dose.*—One tablespoonful three times a day half an hour before meals. A proprietary preparation containing Lecithin, Liquid Malt Extract with Cinchona and Nux Vomica alkaloids. Digestive nerve tonic and food. Each ounce contains 4 grains of Lecithin.

Lecitogen. *Dose.*—3 to 4 drachms. Cocoa containing 1% Lecithin 22% nitrogenous material, 25% fat, 8% starch.—B.M.J.E.ii./05,100.

Effervescent Lecithin 3 grains in 1 drachm (a dose) is prepared. This preparation froths up considerably when added to water for consumption—in this respect it is a little inelegant pharmaceutically. The frothing is unavoidable.

Pilula Lecithin cum Ferri Iodido.—*Martindale.*

Contains 2 grains of Lecithin with 3 grains of Ferrous Iodide. In anæmia to favour increased metabolism and as a tonic in convalescence.

Powdered Lecithin. *Dose.* — 10 to 15 grains (**0·6 to 1·0 Gm.**) thrice daily before food is also prepared.

A light yellowish powder containing 33% Lecithin flavoured with Saccharin and Peppermint Oil. It is suitable for giving in powders and cachets—in the former case the dose to be mixed with ½ wineglassful of water.

Copper-Lecithin.—A combination of Lecithin and Copper Chloride, containing 4·5% of Copper, has been used with good results in phthisis, epithelioma and primary lupus. It has been administered as ointment, injections, in capsules and pills. Doses employed for subcutaneous injection were 0·5 to 1 Cc. of 1 to 2% solution of Copper-Lecithin twice weekly.—B.M.J. ii./13,358; M. 1913.

If 300 Gm. of dry yolk of egg be extracted with Chloroform and the solution evaporated to 1 litre, the solution will absorb 2·5 Gm. Iodine (or 0·2 Gm. of Bromine). Warmed with 10 kilos of nut oil until the Chloroform is driven off, an oil is obtained which, shaken with an equal volume of water, forms a permanent emulsion. Stated to be suitable as a Cod Liver Oil substitute, and for external or subcutaneous use as a vehicle for medicaments.—Patent 1719, of 1906.—P.J. ii./06,723,728.

LIGATURES.

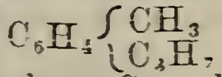
Catgut Ligatures are obtainable commercially 'Raw' and Sulpho-Chromic in hanks in sizes Nos. 000,000 (the thinnest) up to No. 8.

Preparation of Chromic or Sulpho-chromic Catgut Ligatures.

Lord Lister's Directions.—Soak the catgut 24 hours in twenty times its weight of 'preparing liquid'—made as follows:—Dissolve Chromic Acid 4 in water 240 (weight), add Sulphurous Acid Solution (*Off.*) *q.s.* to produce *green* colour of Chromium Sulphate $Cr_2(SO_4)_3 = 392·18$. Then add water to make 480 (weight), next add solution of Mercuric Chloride 2 in water 320 (weight). Dry the catgut on the stretch. The antiseptic Chromium Sulphate Solution, Lord Lister finds the nearest approach to the ideal to produce a ligature capable of fulfilling the necessary conditions as to strength, elasticity and asepsis.—L. i./08,148; B.M.J. i./08,125.

Ligatures are also supplied in carbolic acid solution 1 in 20, carbolised alcohol, turpentine, and various other antiseptics. Sir Watson Cheyne treats first with liquid phenol 24 hours, then keeps in 1 in 20 phenol solution, and rinses in 1 per 2,000 perchloride before use.—L. i./03,349.

Immersion in **Clove Oil** 8 days then in Alcohol 6—8 hours has been advocated for sterilising. A further method is to heat the catgut gradually in **Cumene** to 70° C., then in the same substance to 170° C. for two hours. Finally to rinse in petroleum benzine.

By **Cumene** or **Cumol** is intended a hydrocarbon (a) Trimethyl-benzene $C_6H_3(CH_3)_3[1:3:4] = 120·141$ obtained by fractionation of Coal Tar, it boils between 160° and 170° C.—when pure at 169·8° or (b) Isopropyl-benzene $C_6H_5CH(CH_3)_2$. According to Schmidt this latter boils at 152° C.,—the former body is, therefore, more suitable for sterilising catheters. The names Cumol and Cumene, or better *Cymene*, as distinct from Cumene above are, however, also given to *p*-Methyl-iso-propyl-Benzene  $C_6H_4\begin{cases}CH_3\\C_3H_7\end{cases} = 134·162$. This is obtained from Cumin Oil, and can be made from Camphor. It boils at 175° to 176° C., has Sp. Gr. 0·8678 @ 12° C., and possesses a pleasant odour.

Hardening Treatment.—By soaking 1 hour (a) in 1 in 1000 Potassium Bichromate. These are two to three weeks—soluble or (b) more durable, *i.e.*, to last 5—6 weeks use 1% solution for same period. The gut is supplied in Xylol in sealed tubes.—L. i./07,1074.

Iodised Gut (Claudius' Method).—Raw gut, which has been previously soaked in Ether to remove fat, is sterilised by soaking in a solution of Iodine 1, Potassium Iodide 1½, Distilled Water 100 for ten days. (Some use weak Tincture of Iodine diluted 15 times with 50% Alcohol.) About 4 ounces of Solution is sufficient for half a dozen hanks. The Gut is then of a brown colour, in a sterile pliable condition and ready for use—remove and place in 3% Phenol or Normal Saline prior to operation. Size No. 1 is used for ligatures; No. 2 for small pedicles; No. 3 for large pedicles and abdominal wall.

Iodine-Formalin Catgut.

Catgut prepared with Iodine and Alcohol is washed with a weak Carbolic Solution: it is then treated according to its thickness in a 3% Formalin Solution for twenty-four hours, and washed in water. Store in a solution of Alcohol 50% containing 5% Glycerin and 0·5% Iodine.

Vide also **Iodo-Acetone.**

Fr Cx. sterilises Catgut in absolute alcohol at 120° C. for 45 minutes in sealed tubes of hard glass.

Bacillus tetani isolated from a sample of gut.—B.M.J. i./09,1481.

Catgut sterilised with advantage by ether, chloroform, absolute alcohol or petrol in preference to "chemicals"—any one of them will render gut sterile in 24 hours.—G. S. Thompson, B.M.J. i./17,873.

Absorbable Iodine Catgut.—Catgut, defatted by ether, is boiled in absolute Alcohol for an hour, then placed in a solution of 1 part Strong Solution of Iodine and 11 parts of Water for a week. It is preserved and used from a solution of 1 part Strong Solution of Iodine and 50 parts Rectified Alcohol.—B.M.J. i./10,320.

Kangaroo Tendon, St. G.H. is washed with Ether Soap, treated with antiseptics and preserved in Alcohol.

Horsehair, St. G. H., is boiled in water 10 minutes only;

Palmyra Fibre or Malabar Fibre obtained from the fibrous netting surrounding base of the leaves of the Toddy Palmyras as suturing material satisfactory.—B.M.J. ii./17,780.

Roeder's Method. Picric Acid, saturated solution in Clove Oil. Leave the gut one week in this. Rinse 10 seconds in water and store in 95% Alcohol. In 4 days it is ready for use. It is an advantage to formalise in 5% solution for 24 hours first.—J. D. S. Sinclair, L. i./16,212.

Silk Sutures are supplied on reels and in hanks, sizes 0, 1, 2, also sterilised in Absolute Alcohol and Phenol Solution. Sterilised by immersing in Olive Oil for 12 hours and then boiling in the same and keeping in Carbolised Spirit. In infantile paralysis silk ligaments cause formation of a tough tissue or tendon.

Silkworm Gut, extra fine, fine, medium and stout—is made in 10 and 14 inch lengths.

LIQUORES CONCENTRATI.

This class of preparations introduced into the British Pharmacopœia (1898) was intended to take the place of commercial concentrated decoctions and infusions. One volume diluted with nine of water gave the corresponding infusions and decoctions. Commercially the strength is 1 to 7. They are detailed in the Index.

LITHIUM.

Li=6·94.

Lithium Salts have long had a reputation for assisting in the elimination of Uric Acid, but latterly doubts have been felt on the subject, *c.f.* Piperazin. They should be given freely diluted.

Lithium Poisoning by large doses of Chloride taken experimentally, *e.g.*, 2 Gm. three times a day before meals. In all 4 doses, *i.e.*, 8 Gm., were taken. After the 4th dose taken next night, there was marked dizziness and sleep was impossible. Weakness and tremors were intense the next day. Ocular and aural symptoms lasted 36 hours. There were no gastric intestinal symptoms and appetite remained good.—L. i./13.1815.

Lithii Benzoas, $C_6H_5COO\ Li = 128{\cdot}015$.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) or more.

Usually a light white crystalline powder, Antilithic, *Soluble* about 1 in 4 of water, about 1 in 12 Alcohol 90%. *Incompatible* with Acids and Sodium Bicarbonate.

Lithii Bromidum, Li Br. = 86·86.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

White, deliquescent, slightly bitter granules, neutral reaction; very soluble in water and alcohol.

Contains 91% Bromine as against 67% in Potassium Bromide, hence effect greater, especially as a hypnotic, and in epilepsy. Of great use in Bright's disease.—L. ii./95,685.

Lithii Carbonas. Li_2CO_3 = 73·885.

Dose.—2 to 5 grains (0·12 to 0·3 Gm.). **Tablets,** 5 grains. Soluble in water about 1 in 70. Diuretic, thought to increase the alkalinity of the blood.

Lithii Citras. $C_3H_4OH(COOLi)_3.4H_2O$=281·954.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.). **Tablets,** 5 grains. White crystalline powder. Diuretic. *Soluble* 1 in 2 of water.

Effervescent Lithium Citrate.

Dose.—1 or 2 drachms (4 to 8 Gm.). Contains 1 in 20.

✱**'Vescettes'** (T.M. 260597) of **Lithia,** contain 3 and 5 grains Lithium Citrate.

Lithii Citras Laxativus Effervescens, B.P.C.—30% Sodium Phosphate, 10% Lithium Citrate.

Dose.—60 to 120 grains. A diuretic purgative and antilithic.

Lithii Guaiacas, Lithium Guaiacate.

Dose.—5 grains (0·3 Gm.) in pill twice a day.

Prepared by digesting guaiacum resin in solution of lithium oxide, decanting the solution, evaporating, and scaling it. Contains Lithium Oxide 1, Guaiacum Resin 3. Given for chronic gout and rheumatism.

Lithii Hippuras. $CH_2NH.C_7H_5OCOO.Li$ = 185·059.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

In light white minute crystals, soluble in water 1 in 2½, is a powerful solvent of lithates; useful in gout and rheumatism, *c.f.* Piperazin. **Vescettes** contain 5 grains. **Effervescent Lithium Hippurate** 5 grains in 1 drachm.

T. Bodley Scott warns against using 20 grain doses of lithium hippurate. It is a safe and sure depressor of arterial tension; 3 or 4 grains of the lithium salt or 6 to 7 grains of the ammonium salt suffice.—Pr. Aug. '12,257, *et seq.*

Lithii Iodidum, Li I = 133·86.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

White crystalline deliquescent powder. A salt rich in iodine,—containing 94·7% An antiarthritic and has been employed in syphilis, also in rheumatoid arthritis by iontophoresis, *q.v.*

Lithii Salicylas. $C_6H_4OH.COO$ Li=144·015.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.) for rheumatism and gout. A deliquescent white powder *soluble* 1 in 1 of water, forming a neutral or slightly acid solution. *Incompatible* with acids and with Sodium Bicarbonate.

Effervescent Lithium Salicylate contains 1 in 30.

Dose.—1 or 2 drachms.

Lithii Sulphas $Li_2SO_4H_2O$=109·94.

Dose.—5 to 10 grains (0·1 to 0·6 Gm.).

White crystals soluble in Water and Alcohol. Ionic Solubes are prepared for Iontophoresis, *q.v.*

Lithii Tartras Acidus.

CHOH. COOLi. CHOH. COOH, 1½ H_2O = 183·034.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

White crystalline powder, used in gouty cases with gum affections.

Lithion is a granulated (non-effervescent) preparation composed of lithium citrate, magnesium sulphate, sodium sulphate, &c. *Dose.*—One-half to one teaspoonful taken in a little warm water.

∗**Thialion** (T.M. 221418) is a laxative Lithia Compound.
Sodium Sulphate (anhydrous) 26%, Sodium Citrate 56%, Sodium Chloride 3%, Potassium Citrate 3%, Lithium Citrate 3%, Water 9%.—B.M.J. ii./08,779.

MAGNESIUM.

$Mg = 24{\cdot}32$.

Magnesii Carbonas Levis (*Off.*). $3(MgCO_3),Mg(HO)_2,4H_2O = 383{\cdot}375$. (This formula is no longer given in B.P.). Is prepared by precipitation of Magnesium Sulphate Solution with Sodium Carbonate. **Magnesii Carbonas Ponderosus,** similarly in more concentrated solution and by boiling and evaporation to dryness, and washing with water to remove Sulphate. *Dose.*—5 to 20 grains repeated, or 30 to 60 grains as a single administration.

Liquor Magnesii Bicarbonatis (**Carbonatis**) (*Off.*). FLUID MAGNESIA. *Dose.*—1 to 2 ounces (**30 to 60 Cc.**)

A colourless liquid, containing 10 grains of Magnesium Carbonate in 1 ounce of Carbonic Acid water.

In cancer, 8 to 12 Gm. a day of Magnesium Carbonate has been favoured by Dubord of Dijon. Magnesium Chloride suggested as more suitable.—B.M.J. ii./18,118.

Magnesia Levis and Magnesia Ponderosa, (*Off.*) $MgO = 40{\cdot}32$ are prepared from the respective carbonates by exposure to a dull red heat. *Doses* as for carbonates. Antacid, antilithic, diuretic, laxative.

∗**Bisurated** (T.M. 340411) **Magnesia.**—*Dose.*—Half teaspoonful in water after meals. A proprietary article termed 'an Antacid,' in form of a white powder.

Mannich and Leemhuis find it to contain approximately Bismuth Carbonate 8, Sodium Bicarbonate 40, Magnesium Carbonate (probably heavy) 52. —P.J. ii./13,257,563.

Liquor Magnesii Citratis U.S. *Limonade Purgative au Citrate de Magnésie.* FR. CX.

Average daily dose.—12 ounces

Magnesium Carbonate 15, Citric Acid 33, Syrup of Citric Acid 60, Potassium Bicarbonate 2·5, Water *q.s.* to nearly 360.

The following is a modification of the FR. CX. formula (gaseous variety) as prepared on the Riviera:—

Sodium bicarbonate (about 3 or 4 Gm.) is first placed in the dry bottle (about 400 Cc. capacity); syrup (70 Gm.) is added on to this, *alcohol limone* (about 1 Gm.) added, then a solution (prepared in the cold) of magnesium carbonate (18 Gm.) and citric acid (crystal) (32 Gm.) in about 150 Cc. of water, is added. The citric acid is in decided excess. The syrup prevents the sodium bicarbonate and magnesium carbonate solution from touching each other. The bottle is then filled up to within half an inch of the shoulder with water. A good cork is used, which is tied down securely, the bottle then well shaken, and the purgative is ready. **Limonada Rogé** in S. America is similar to FR. CX.—Ph. Notes.

Magnesii Chloridum, $MgCl_2$, $6H_2O$ = 203·336. *Dose.*—30 to 60 grains (2 to 4 Gm.) increased.

Deliquescent crystals, very soluble in water. Mild purgative, a dose in ½ pint of hot water useful for constipation and in dyspepsia and stomach disorders.

War wounds have been treated with 1·2% Solution.—*See* Wounds.

Magnesii Chloras. $Mg(ClO_3)_2$, $6H_2O$ = 299·336.

Deliquescent white crystals made by decomposing the barium salt with Magnesium Sulphate.

Has been used in form of ointment (20%) on epithelioma of the lip.

Magnesii Hydroxidum, $Mg(OH_2)$=58·336. Magnèsie Hydratée. Fr. Cx.

Dose.—5 grains to 2 drachms (0·3 to 8 Gm.).

Prepared by decomposition of Magnesium Sulphate 24½ with Sodium Hydroxide 8 in solution, the precipitate washed free from sulphate and dried at low heat.

According to the Fr. Cx., calcined magnesia is boiled with 20 to 30 times its weight of distilled water 20 minutes. Dry as much as possible by collecting on calico and finally at 50° C. until it no longer loses weight. Thus prepared, Magnesium Hydroxide contains 31% H_2O.

It dissolves more freely in dilute acids than calcined magnesia. It is a recognised antidote in arsenical poisoning.

* **Alkagen Tablets** (T.M. 347033). *Dose.*—1 to 3 with water. Contain Magnesium Hydroxide and Peppermint Oil. For "acidity," flatulence, etc. It is not open to the objection that Carbonic Acid is liberated as in the case of Carbonates and Bicarbonates.

Pulvis Magnesii Hydroxidi cum Carbone.

Dose.—1 to 2 drachms in a little water after meals.

Magnesium Hydroxide 1, Wood Charcoal 2.

Is suggested in dyspepsia. The Magnesium Hydroxide is antacid and the charcoal has the property of gas absorption. Furthermore, the charcoal would tend to preserve the hydroxide.

A little cinnamon powder (1 in 8) is occasionally added.

Cremor Magnesiæ. Magnesia Cream.

Dose.—1 to 4 drachms in a little water.

A palatable concentrated preparation. Each ounce represents 24 grains of suspended Magnesium Hydroxide. Antacid without evolving Carbon Dioxide—hence no distension is caused.

Uses.—In indigestion, dyspepsia, acidity, rheumatism, and as an alkaline mouth wash, forming a film of Magnesium Hydrate over the tooth surface. A useful antidote in case of poisoning by mineral acids.

Magnesii Lactas.—$(C_2H_4\ OH.\ COO)_2Mg.\ 3H_2O$ = 256·478.

Dose.—15 to 60 grains (1 to 4 Gm.). White crystalline powder. *Soluble* 1 in 30 of water.

Useful in some cases as a hæmostatic where Calcium Salts do not seem to act. A dose of 30 grains usually reduces time of coagulation of the blood 30%, *e.g.*, from 2 to 1¼ minutes. The salt can be made extemporaneously by the dispenser, if prescribed in a mixture, from Magnesia, with Lactic Acid *q.s.* The large dose of the bulky powder, if ordered in that form, is inconvenient to take. Note.—Magnesium Oxide 1 requires Lactic Acid (75%) about 5 to dissolve it.

Oozing of blood from the gums has been well treated by 40 to 60 grain doses. For erosion of bone, due to scurvy, this and the Calcium Salt valuable.—Sir A. E. Wright.—L. ii./08,725.

Magnesii Sulphas. FR. SEL ANGLAIS or SEL D'ANGLETERRE.
$MgSO_4.7H_2O = 246{\cdot}492$.
Dose.—2 to 4 drachms or 30 to 90 grains repeated (*Off.*).
Soluble 10 in 13 of water—measuring 18·5. ***Incompatible*** with Soda Tartarata and Alkaline Carbonates.
Flavoring.—Glyl Menthæ Piperitæ, Glyl Cinnamomi; Syrupus Zingiberis

Solutions kept ready for dispensing should be well sterilised ; this will effectually prevent the fungoid growth which occasionally occurs.

Uses.—Largely employed as an efficient evacuant.

Dysentery in South Africa treated by the " Evacuant Method "—Magnesium and Sodium Sulphates, Castor Oil, Calomel, also with Ipecacuanha Powder.—L. ii./03,7.

Intraspinal Anæsthesia has been induced by injecting Magnesium Sulphate in dilute solution.

Tetanus has been treated by spinal, intracerebral and subcutaneous injection—the usual dose being 1 to 5 Cc. of 25% solution. In Germany during the war fairly large doses have been given. 1 Cc. of the 25% Solution for every 25 lbs. body weight every 24 hours—not more than 45 to 60 grains at one time. If found toxic employ artificial respiration and give cardiac stimulants. Calcium Chloride is an antidote to Magnesium Sulphate—an injection of 5 Cc. of 5% solution counteracts the effects almost instantaneously.—Pres. The method is not found of service by our W.O. authorities. Intraspinally it is an anticonvulsant, but it is best to use dilute solution in large amounts,—a pint to a quart of 1 to 2% solution at intervals by hypodermoclysis.—H. Greeley, L. i./15,99.

Further abstracts and references, *vide* previous editions.

Chorea treated by 1 to 5 Cc. of 25% Solution of the *pure* salt. Weaker Solution, *e.g.*, 7·3%, which is isotonic with the cerebro-spinal fluid is, however, advised—of this 3·4 Cc. = 1 Cc. of the 25%.—B.M.J. ii./08,1707. M.P.C. ii./11,583. In ulceration of rectum to promote lymph flow to intestinal walls. In epilepsy 1 Cc. of 1 in 5 Solution or 1 Cc. of 1 in 2 Magnesium Chloride hypodermically beneficial.—B.M.J. i./08,12. For local pain, solution applied on gauze, renewed every ½ hour. For warts one drachm doses internally stated to give remarkable results.

Eclampsia, Suppression of the convulsions in.—Intrathecal injections of 25% Magnesium Sulphate Solution, allowing 1 Cc. for everry 25lbs. (approx.) —L. ii./12,1575.

Poisoning by Magnesium Sulphate.—
Seven cases in all are reported since 1841. In the particular case reported here subcutaneous injections of Saline into tissues of axilla gave relief, also Calomel ½ grain every hour until bowels opened and recovery.—L. i./09,1174.

In acute articular rheumatism and in gonorrhœal epididymitis, orchitis, gonorrhœal rheumatism, neuritis, also in erysipelas and cellulitis, and in general for the relief of pain associated with local inflammation, local application of a hot saturated solution in 10 to 15 layers of gauze or a thin layer of Absorbent Cotton or Lint applied around the limb or on the face has given extraordinary results. Action is empirical—not due to osmosis.—L. i./11,300.

In rheumatism injected into the buttock and infra-scapular region, *Dose*—4 Cc. of 25% Solution daily for the first three or four days and then alternate days.—P.J. i./12,124. 3 grain doses hypodermically purge and relieve.—L. ii./11,481.

Magnesium Sulphate Cream.

Mix together exsiccated Magnesium Sulphate 1½ lbs. with 11 ounces of Glycerole of Carbolic Acid (1 in 10) in a hot mortar to make a cream. (The carbolic acid may, however, be omitted.) Pack and thickly cover the wound with the cream. The dressing of gauze and wool is left unchanged for 3 to 8 days. Profuse discharge of serum takes place, so that more wool may be wanted. After a few dressings like this Magnesium Sulphate *solution* is used.

In deeper wounds where fracture is also present alternate use of B.I.P.P. or "X.Y.Z." Paste. (Bismuth Tribromphenol, Ammoniated Mercury equal parts with Liquid Paraffin to make a paste.)

Magnesium Sulphate Cream is simple in use. There is relative infrequent dressing, good osmotic action and inhibitory effect on the aërobic and anaërobic organisms.—A. E. Morison, B.M.J. i./18,342.

A solution of 35 grains to the ounce useful as lotion in lymphangitis, erysipelas, cellulitis, orchitis, epididymitis and all vague œdemas and swellings.—B.M.J. i./16,400.

As a **Granular Effervescent** preparation. *Dose.*—½ to 1 ounce (**15 to 30 Gm.**), or 1 to 3 drachms (**4 to 12 Gm.**) repeated, magnesium Sulphate is frequently more effective, and more palatable.

'Vescettes' of Magnesium Sulphate, each containing 30 grains.

To be crushed and dissolved in a small draught of warm water.

Mistura Alba. *Dose.*—½ to 2 ounces.

Magnesium Sulphate 30 grains, Magnesium Carbonate 15 grains, and Peppermint Water 1 ounce. A mild aperient.

Magnesii Sulphas Exsiccatus.—If crystallised Magnesium Sulphate be heated at 100° C. it will lose 37—40% moisture. It is a fine white powder without odour with a saline bitter taste, giving a warm sensation to the tongue due to its recombining with water. Almost completely soluble in water. Aqueous solution (1 in 40) should be neutral to litmus paper.

Enema Magnesii Sulphatis. ½ to 2 ounces in ½ to 1 pint of water.

Magnesii Sulphis, *v.*p. 98.

MALTUM.

Maltum. Grain of barley partially germinated artificially and then dried. Yields 70% extract. The acidity calculated as lactic acid should not exceed 0·3%. It should not contain more than 1/100 grain Arsenic calculated as Arsenious Oxide to the pound.

Malti Pulvis. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

Malt flour or entire malt powdered, is added to baked wheaten flour in various proportions to form the popular infants' foods, and is given to assist digestion. When these are mixed with hot water or a mixture of hot milk and water, the starch contained in the wheaten flour becomes soluble and digested into dextrin and malt sugar. The diastasic property of malt is most acute in aqueous solution at 104° F.,—a boiling heat destroys it. A small teaspoonful of malt flour may be sprinkled over or mixed with cooked farinaceous foods, coffee, beer, &c.

Diastase. Obtained by exhausting malt with tepid water, precipitating with alcohol, and drying at below 45° C. Is a yellowish white powder or in translucent scales. According to Fr. Cx. diastase converts 100 times its weight of starch into sugar and dextrin. Its use is indicated by the presence of starch grains in the fæces or urine.

Extractum Malti.—*Syn.* EXTRACTUM BYNES, Extrait d'Orges. *Dose.*—1 to 4 drachms.

A brownish semi-liquid substance Sp. Gr. about 1·400, with pleasant sweet taste, consisting principally of maltose (about 50%), with dextrin, dextrose, diastase, proteid, phosphates and aromatic principles. It is made by mixing malt with tepid water (55° C., *i.e.*,131°F.), pressing, filtering, and evaporating *in vacuo* at below 55° C. Extract of Malt and its preparations are prescribed in cases of debility of all kinds, as a restorative, like cod liver oil, but particularly where digestion is weak.

It should digest twice its weight of arrowroot starch in 30 minutes at 40° C. (B.P.C., 1901).

For further information on the assay of malt preparations, and adulterants, see Vol. II.

Incompatibility. We recently conducted a research to determine the compatibility or incompatibility of numerous Soluble Chemicals with Malt Diastase. Broadly speaking, the following are incompatible: **Acids**, various Inorganic and Organic, also **Acid Preparations, Ferric Chloride, Pepsin Preparations, Potassium Permanganate.** In *Vol. II.* we provide details of results. *c.f. also* **'Enzyme Action.'**

A mixture of Hydrogen Peroxide and Ferrous Sulphate can liquefy starch similarly to an enzyme.—C.D. ii./13,851.

***Maltaffin.** (T.M. 355917)—*Martindale.*

Dose.—One to two teaspoonsful at bedtime. Children, half to one teaspoonful, increased if necessary.

A combination of Liquid Hydrocarbon Oil with Malt Extract as an electuary. Suitable for children. The oily taste is largely masked.

Maltaffin is also made combined with **Hypophosphites**, with **Cascara**, with **Iron**, with **Glycerophosphates**, and with **Quinine** and **Strychnine.**

***Maltine** (T.M. 15025) is obtainable plain; with cod liver oil 30%; with iron pyrophosphate 8 grains to the ounce; with pepsin and pancreatin; with hypophosphites of lime 3 grains, of soda 3 grains, of iron 2 grains in the ounce; with phosphate of lime 4 grains, of soda 4 grains, and of iron 3 grains in the ounce (Malted chemical food); with Ⓟ iron pyrophosphate 4 grains, quinine 1 grain and strychnine $\frac{2}{75}$ grain in each ounce; with cascara = 66 minims of liquid extract; and with creosote 4 minims to the ounce.

Maltine with Cod Liver Oil. Analysis of.—B.M.J. i./10,30.

Cream of Malt is a special preparation. It is supplied 'plain,' with Cascara, with Cod Liver Oil, with Cod Liver Oil and Hypophosphites, with Creosote, Dialysed Iron, Ⓟ Easton's Syrup, &c.

Diamalt is stated to have diastasic power 1060—(1392 elsewhere)—higher than many of the Malt Extracts on the market. Contains 5·8% proteins.

Digested seven times its weight of starch at body temperature.—L. i./09,551.

Diamalt with Cod Liver Oil contains 16·6% 'Oil,' and the Extract present has diastatic power—592. Commercial brands compared.—B.M.J. i./10,30.

***Diaparaffin.** (T.M. 354317). *Dose.*—1 or 2 (children ½ to 1) tablespoonsful A palatable combination of Diamalt and Paraffin. An efficient laxative in dry powder form. It contains 28·2% Liquid Paraffin.—L. i./14,41.

PATENTS: See 13,928/1913 and 26,390/1913; also 29,481/1912.

Extractum Malti Liquidum.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

In place of evaporating malt infusion to the viscosity of the solid extract, if it be concentrated *in vacuo* to prevent decomposition of the ferment diastase until it has Sp. Gr. 1·375, and about 7% of alcohol added, making the finished product of Sp. Gr. 1·250, a liquid extract is formed which is more convenient.

Glycerin is added; Alcohol only precipitates the diastase, also a small quantity of Formaldehyde as preservative.—P.J. ii./07,732.

A commercial brand of Liquid Malt Extract is known as ✱Bynin (T.M. 41136).

Ⓟ ✱**Bynin Amara.** *Dose.*—2 to 4 drachms well diluted.

Contains Quinine Phosphate $1\frac{1}{2}$ grains, Iron Phosphate 2 grains, Strychnine Phosphate $\frac{1}{16}$ grain, in liquid malt extract (Bynin) 1 ounce. It is $\frac{1}{4}$ the strength of Easton's Syrup.

Extractum Malti cum Hypophosphitibus.

Dose.—1 to 4 drachms (4 to 15 Cc.). Dissolve Calcium Hypophosphite 0·5 in water 4, and Sodium Hypophosphite 0·5 in water 1, then add Liquid Extract of Malt *q.s.* to 100.

Extractum Malti cum Hypophosphitibus cum Oleo Morrhuæ.

Dose.—1 to 4 drachms (4 to 15 Cc.). Contains Calcium Hypophosphite and Sodium Hypophosphite of each 0·5, Cod Liver Oil 15 and Liquid Malt Extract *q.s.* to 100. Label this 'Shake the bottle.'

Extractum Malti cum Cascara.

Dose.—1 to 4 drachms (4 to 15 Cc.). Liquid Extract of Cascara 1, Liquid Extract of Malt 7. This is palatable. Mix and mark 'Shake.'

Extractum Malti Ferratum, G. H., E.

Iron Pyrophosphate 2, Water 3. Dissolve and add Extract of Malt 95. *Dose.*—1 to 4 drachms (4 to 15 Gm.).

Extractum Malti cum Hæmoglobin.

Dose.—1 to 4 drachms (4 to 15 Cc.).—Hæmoglobin 1, Liquid Extract of Malt 7. Mix and mark 'Shake.'

Extractum Malti cum Syrupo Ferri Phosphatis. *Syn.* MALTOFERROSE. *Dose.*—1 to 4 drachms.

Containing in each drachm: Phosphate of Iron $\frac{1}{4}$ grain, and $\frac{1}{2}$ grain Calcium Phosphate, with $\frac{1}{4}$ grain each of Sodium and Potassium Phosphates.

Extractum Malti cum Oleo Morrhuæ. *Dose.*—1 to 4 drachms (4 to 15 Cc.).

This preparation should contain at least 15% Cod Liver Oil.

Extractum Malti cum Pancreatina. *Dose.*—1 to 4 drachms (4 to 15 Cc.). Liquid Extract of Malt 2, Pancreatic Solution 1.

We find this produces a perfectly clear solution without any deposit: on the other hand, made with Pancreatin 2, Glycerin 10, and Liquid Extract of Malt to 100, the result was not satisfactory. Assists digestion of farinaceous food.

✱**Bronamalt** (T.M. 340637) (previously known as Vibrona Malt).

Dose.—1 to 2 drachms with or immediately after meals.

Described as a tonic food. A combination of a hydrobromic Extract of Cinchona with a liquid Malt. In cases of impaired nutrition and loss of appetite, especially in children.

✱**Lacto Maltine** (M.M. 156408 Class 42).

Dose.—One dessert-spoonful after meals in tea, coffee, milk, wine or farinaceous food.

A preparation rich in milk-fat, easily digested. The diastasic ferment acts as an adjunct where there is feeble carbohydrate digestion.

Extractum Malti Siccum.

Contains about 75% Maltose, 1·5% Phosphates, 5% Albuminoids. *Dose.*—1 to 2 drachms.

A somewhat hygroscopic yellowish coarse powder, easily soluble in water. Is desiccated carefully *in vacuo* and hence keeps well.

In some experiments we found British Dried Malt Extract to be more active than foreign, but not quite so active as Extractum Malti.

Dry Malt Extract with 50% Paraffin.

Dose.—Infants, one teaspoonful dissolved in slightly warmed milk feed three times a day. Children, two teaspoonfuls two or three times a day. Adults, one tablespoonful three or four times daily. Best taken just before or after meals.

This has the appearance of a crystalline compound. It emulsifies with water.—L. i./15,918.

Taka Diastase. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

A whitish powder obtained by the cultivation of a fungus, *Eurotium Oryzæ*, on bran; possesses amylolytic properties.

Useful for gouty dyspepsia and hyperacidity of the stomach.

Taka Diastase in 5 grain Capsules after each meal and at bed-time improves diabetes mellitus,—amount of urine and sugar content lessened.—L. i./11,826.

✱**Digestin** (T.M. 317395 and 335491). *Dose.*—1½ to 5 grains(**0·1 to 0·3 Gm.**) in water immediately after meals.

A digestive ferment from the Okazaki fungus (Family *Aspegillus*, 'yellow mildew'). It is a yellowish powder practically soluble in water. It reduces starch paste 100 times its weight, at body temperature almost instantly into a limpid fluid, converting it finally (in one hour) into sugar. It is also said to convert 100 times its weight of milk into assimilable form (mostly peptone). It acts in the presence of gastric juice,—may hence be given in cases of non-assimilation of food. Experiments on the liquefying of animal fibrin were not successful,—the "*Lancet*" did not observe any marked digestive action on Protein either in weak alkaline or acid fluid.—L. ii./10,895. Pres Apl, 1911, p. 99.

MANGANESIUM. (*See also* p. 358).

Mn = 54·93.

Manganesii Oxidum Præcipitatum.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**), or more, in pills with syrup. Tablets, 2 grains (**0·12 Gm.**).

Manufactured by removing the matter soluble in dilute hydrochloric acid from commercial manganese oxide, removing the acid and washing the residue, utilising the lighter portions only of the residue.

Consists principally of manganese di-oxide $MnO_2 = 86·83$ (U.S. contains not less than 80% MnO_2), a bulky blackish brown powder, free from grittiness and entirely soluble in cold hydrochloric acid. *Uses.*—In gastrodynia, pyrosis, and in amenorrhœa taken 3 or 4 times a day before expected period. In chlorosis it assists the action of iron salts, and is less irritant than the permanganates.

Manganesii Citras, 'Soluble.' *Dose.*—3 to 5 grains (**0·2 to 0·3 Gm.**).

This, a double salt with Sodium Citrate, **Ferro-Manganese Phosphate**—*Dose.*—3 to 10 grains (**0·2 to 0·6 Gm.**)—and other scale preparations are made.—P.J. ii./01,136; Y.B.P. 1901,458.

Manganesii Hypophosphis, $MnP_2H_4O_4+H_2O=203·058$. *Dose.*—1 to 10 grains (**0·06 to 0·6** Gm.).

A white or slightly rose-tinted powder, soluble 1 in 10 of water. nerve stimulant.

Manganesii Phosphas, $Mn_3P_2O_8.7H_2O = 480·982$. *Dose.*—1 to 5 grains (0·06 to 0·3 Gm.).

A white powder, generally with a pinkish tint, insoluble in water. From ½ to 1 grain is given in 1 drachm of syrup of ferrous phosphate.

Manganesii Sulphas, $MnSO_4+4H_2O=223·054$. *Dose,* of powder, 2 to 10 grains (0·12 to 0·6 Gm.).

A white powder with a faint pink tint, due to a little manganic sulphate or in pink crystals. *Soluble* about 1 in 1½ water. For jaundice 60 grains is a cholagogue purgative ; not reliable, may cause sickness.

Potassii Permanganas. $K_2Mn_2O_8=316·06$. (*Off.*)

Dose.—1 to 3 grains (0·06 to 0.2 Gm.) in well-diluted solution, or in pill. Capsules contain 1 grain (0·06 Gm.).

Potassium Permanganate may be prepared by oxidising manganese dioxide by the aid of potassium chlorate in the presence of potassium hydroxide.

Manufacture.—Electro-chemical method. By oxidation of the Manganate in an electrolyser. Surrounding the anode is a solution of Alkali and round the cathode is a solution obtained by lixiviating the melt of Manganese Dioxide and Potassium Hydroxide (Manganate). Dichromates, Perchlorates and Persulphates can be made similarly.—P.J. i./16,3.

Incompatible with all vegetable oxidisable matter, *e.g.*, glycerin, alcohol, sugar, fats and oils, with ammonia, ammonium salts and alkaloids.

Poisoning by 15 to 20 Gm. dissolved in water : was treated both by lavage and internally with Magnesia as Hydrochloric Acid was alleged—also a cardiac tonic—a digitalis preparation—the Potassium had probably produced the toxic symptoms on the heart. *Recovery.*—L. ii /11,907.

Uses.—The **Saturated Solution** (1 in 20 of water) is strongly bactericidal, as a disinfectant its colour is an advantage. Even 1 in 1,000 is efficient, *c.f.*, Vol. II. It is a good deodoriser.

A dilute solution will dye white hair to a chestnut brown.

In amenorrhœa, 1 or 2 grains, in a pill 3 or 4 times a day should be given for a few days before the time of the expected period.

For gonorrhœa 1 in 10,000 to 1 in 1,000 is used as a warm irrigation or injection.

It is as good (1 in 1,000 solution) as silver preparations. In place of injection irrigation (JANET'S METHOD) is often used. In cases seen early before acute inflammatory symptoms and purulent discharges have appeared, abortive treatment is sometimes successful, but not likely to succeed after 24 hours. This consists of irrigation of the anterior part of the urethra with this solution.—C. F. Marshall, M.P.C., Feb. 1st and 8th, 1911.

Irrigation with Permanganate for gonorrhœa in a field ambulance—no definite strength adhered to as the urethra gradually acquires toleration to it.—E. T. Burke, L. i./17,756.

For cholera and dysentery rectal injection 4 grains to the pint is used, also *per os* as drink and pill.—*vide* p. 537.

In ozœna a spray of the Liquor 5 minims with Sodium Chloride 5 grains to the ounce of water is useful.—Tilley.

Gonorrhœal conjunctivitis in the adult treated by prolonged unintermitting stream of 1 in 15,000 to 1 in 20,000 solution.—L.i./12,91.

Gargle, Mouth Wash, or **Vaginal Injection** 1 in 5,000 of water is useful.

The solution is very nauseous to the taste. Useful for applying to foul ulcers and patches of gangrene, and to carbuncles as mild caustic. In bromidrosis, wash the feet first in benzene, then in 1% permanganate (at night). Powder (during the day) with Potassium Permanganate 13, Alum 1, Talc 50, Zinc Oxide 18, Zinc Chloride 18. Bath of borax and benzoin also useful.

Offensive breath. 1 or 2 grains in a glass of soda water taken on an empty stomach certain cure.—B.M.J. i./13,148.

Snake bite lancets are prepared containing the crystals.

Directions.—Squeeze the part so as to press out the venom, then cut with the lancet, making several incisions deeper than the bite, and rub in the dry crystals thoroughly, moistening with water if necessary. Tie a ligature or handkerchief between the bite and the heart as soon as possible to prevent the venom getting into the circulatory system. Equally good in all kinds of snake bite.

If a tube of ethyl chloride is at hand spray the part whilst making incisions.

Scorpion stings are best treated by ammonia or an evaporating lotion to the affected part, also Potassium Permanganate as in snake bite.—L. Brunton, L. ii./15,200.

A case of Adder Bite, treated with Potassium Permanganate Crystals, hot rectal injections of Normal Saline, hypodermic of Strychnine and 10 Cc. of Normal Horse Serum thrice daily—recovery.—B.M.J. i./12,420.

Legros Outfit comprises an oxidising agent, which on injection only decomposes slowly in the blood, and the effect is to attack the venom which may have entered the circulation.

Vomiting of pregnancy treated by 2 to 4 grains Potassium Permanganate in a cachet, giving immediately afterwards 3 to 4 ounces of water. Patient keeps this in the stomach 10 to 20 minutes—lying very still—then a pint or more of warm water. If necessary a further 1 grain of Permanganate per hour.—B.M.J. i./07,684.

Tuberculous fistulæ and dactylitis successfully treated by packing with the crystals twice a week.—Pres., Apl. 1910,65.

Tuberculous ulcers yield to potassium permanganate 1 drachm to the ounce followed by Starch Iodide (Pasta Amyli Iodidi, *q.v.*).

Isolated lupus nodules treated by applying saturated solution or by boring holes with wooden skewer, filling with permanganate and moistening the surface with water and repeating a few hours later, using novocain and adrenalin.—B.M.J. ii./03,194; L. ii./08,471.

Sloughing and Tetanus-infected wounds according to Sir Leonard Rogers may be well treated with not less than 1 in 500 Potassium Permanganate Solution. Worthy of trial in the field for irrigating all earth and dust infected wounds.—B.M.J., Dec. 19,14.

Cholera treated by 2 grains of Potassium Permanganate every ¼ hour for 2 hours, then 1 pill every ½ hour. These are continued until the stools become green and less copious—this is usually attained in 12 to 24 hours. A weak solution (1 to 6 grains per pint) of Calcium Permanganate is allowed as a drink. 50 grains of permanganates by the mouth in 24 hours have been given without harm, and even larger doses would probably be tolerated—in addition hypertonic saline injections (*q.v.*).—B.M.J. i./11,760.

War wounds have been treated by the powdered permanganate. *See* Wounds.

Pilula Potassii Permanganatis.

1, 2, 3, 4 or 5 grains with Kaolin Ointment, *q.s.*

Caution! Avoid mixing any easily oxidised substance, like sugar, glycerin, &c. The pills may be coated with sandarach solution.

In amenorrhœa.—Pr., Feb. 1911, p. 325.

Tablets contain 1, 2 and 3 grains. To be dissolved.

'**Solubes**' 5 grains for preparing lotions and vaginal injections; to be dissolved in ½ a pint or more of water.

Lotion 'Sterules' of Potassium Permanganate contain 8·75 grains. 1 diluted to 1 pint produces a 1 in 1,000 solution.

Permanganate Tablets for purifying Drinking Water. (Laurent's). To each litre of water add Potassium Permanganate 0·03 Gm. and Powdered Alum 0·06 Gm. After standing 5 minutes, if the solution is not pink add another tablet or two. Remove excess of Permanganate by Sodium Hyposulphite 0·03 Gm. and dried Sodium Carbonate 0·06 Gm. After 10 minutes pass through cotton wool Ingredients may be in tablet form.—P.J. i./15,124.

Calcii Permanganas.

$Ca(MnO_4)_2+5H_2O=368·01$.

Dose.—¼ grain (0·016 Gm.) in **Pills** or **Capsules** (with Liquid Paraffin as vehicle) thrice daily one hour before meals.

Deliquescent crimson crystals preferred for making mouth lotions, as it has less taste than the Potassium Salt. 1 in 100,000 sterilises water in 5 minutes; more powerful than the latter.

It was introduced in the 'fifties' by the late H. B. Condy.—B.M.J. ii./12,1692.

Internal use in rodent ulcer, beneficial even on recurrence after X-ray treatment. Gastric ulcer with usual symptoms greatly improved. In gastritis excellent results with ¼ grain doses and plenty of water. Effect ascribed partly to the oxidising power and partly to the nutrient effect of the calcium.—B.M.J. ii./09,1674.

In cholera dilute solution as drink. *C.f.* Potassium Permanganate.

Sodii Permanganas.

$Na_2Mn_2O_8=283·86$. In solution, red in colour, is used as a cheap disinfectant. ✱**Condy's Red Fluid** (T.M. Condy's & Condy's Fluid Co. 25750) contains this salt. This manufacturers' **Green Fluid** has Sodium Manganate $Na_2\ Mn\ O_4=164·93$ in solution.—L. ii./00,1587; i./03,971.

Zinci Permanganas.

$Zn(MnO_4)_2+2H_2O = 339·262$. Deliquescent brown crystals; for lotions and injections, 1 grain in 8 ounces (1 in 4,000), where the astringent action of the zinc is indicated. As an eye wash 1 in 1,000 to 1 in 2,000.

For gonorrhœa excellent.—Campbell Williams.

For pyorrhœa alveolaris and oral sepsis as mouth wash it is very useful. '**Solubes**' ¼ grain each to make 2 ounces of solution.

'**Collapsubes**' with catheter attachment, of Zinc Permanganate in Soft Paraffin; strength 1 in 2,000 for use in chronic gonorrhœa.

MENTHOL.

METHYL-PROPYL-PHENOL HEXAHYDRIDE. $C_{10}H_{20}O$=158·21.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more in a pill with powdered soap, or in solution in olive oil.

A white crystalline substance deposited on cooling **Oil of Peppermint** *q.v.* Obtained from *Mentha arvensis, vars. piperascens et glabrata*, and *M. piperita* (*Labiatæ*), it melts at 44° C. (*Off.* 42 to 43°).

Soluble 5 in 1 of 90% Alcohol, also in Ether 2 in 1, Chloroform 4 in 1 approximately, 1 in 4 of Olive Oil, and in Petroleum Spirit 10 in 7. Sparingly soluble in water, insoluble in glycerin. Soluble on warming in a strong solution of Sodium Salicylate, but throws out again.

Uses.—Given internally, it acts as a diffusible stimulant. Of value in the vomiting of pregnancy. Its solutions, applied to the skin, affect the nerves of the part somewhat like aconite, and form useful pigments for headache, rheumatic pains and neuralgia. It has antiseptic and anæsthetic properties, and gives great relief in prurigo, urticaria and pruritus ani. It liquefies when gently rubbed on the painful part.

As an antineuralgic in toothache and for sciatica 1 in 60 of Alcohol with a little Clove Oil, is employed; also Menthol Cones. The crystals on cotton wool may be placed in the hollow of an aching tooth.

Caution.—It is dangerous to apply an ointment containing Menthol to the nostrils of infants, *e.g.*, for treatment of catarrh,—may cause instant collapse.—*C.f.* Camphor.

Menthol liquefies with an equal amount of either Carbolic Acid, Chloral Hydrate or Thymol, also 3 parts of Menthol and 2 parts of Camphor, 2 parts of Menthol and 1 part of Butyl Chloral Hydrate, and 2 parts of Menthol, with 1 of each Phenol and Butyl Chloral Hydrate. These will relieve toothache. Its Camphor and Phenol combinations* are used to medicate **oro-nasal 'Ozonic' and the Nasal 'Ozonic,'** and other dry inhalers, and are most beneficial for arresting and curing colds, and relieving influenza and chest affections.

For the inhalation of hot medicated moist air the '**Portable**' and '**Poor Man's Inhaler**' may be used *c.f.* Creosote and other vapours.

Menthol—Camphor and other combinations, diluted with a heavy mineral oil, for spraying into the nares or in spirituous solution, inhaled as above, relieve swelling and irritability of nasal catarrh, contracts capillary blood-vessels of mucous membrane, reduce swelling, relieve pain and fulness of head, arrest sneezing, check excessive discharge, and correct perverted secretion. *c.f.* Nebulæ.

For ringworm of the scalp, 1 part Menthol in 4 volumes of Chloroform and 12 volumes Olive Oil.

For threadworms injection of Menthol 1 grain in Olive Oil 1 ounce.

In the intractable vomiting occurring in cholera, further in acute and chronic forms of asthma, of great service, though not so rapid as morphine. For dyspnœa of pulmonary origin, *e.g.* in emphysema of lungs, quietens the cough and relieves the dyspnœa. Allays colicky pains and checks painful evacuation. Undoubted service in hyperchlorhydria—in this a dose of 0·25 Gm. with 5 Gm of Sodium Phosphate is given about 2 hours after each principal meal.—B.M.J.E. ii./08.51.

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* Ⓟ**Menthophenol**. Menthol 3, Phenol 1; Useful as gargle: 15 drops to the tumbler of water.

Aqua Mentholis. Menthol 1, Alcohol 15, Distilled Water 1,000.

Menthol Plasters, 10 to 15% in a suitable basis (Ⓟ if Lead basis) are useful for rheumatism and intercostal neuralgia.

Injectio Mentholis.
Menthol 0·5, Liquid Paraffin 100. For use with an Eustachian catheter to the middle ear.

Sterules, Hypodermic, of Menthol contain $\frac{1}{5}$ grain (0·012 Gm.) in 40 minims Liquid Paraffin.

Insufflatio Mentholis. Menthol 1, Ammonium Chloride 3, Boric Acid 2, and Lycopodium 6, relieves nasal catarrh.

Ⓟ**Insufflatio Menthol et Cocainæ R.F.H.** Menthol 3 grains, Cocaine Hydrochloride $\frac{1}{2}$ grain, Boric Acid Powder $\frac{1}{2}$ ounce, Bismuth Carbonate $\frac{1}{2}$ ounce.

Ⓟ**Linimentum Mentholis.** (Adopted by B.P.C.).
Menthol 3, Chloroform 4, Olive Oil *q.s.* to 16; is useful in lumbago, neuralgia, sciatica, and ringworm.

P1 **Linimentum Mentholis Compositum.**—S. H.
Menthol 3, Tincture of Aconite 4, Chloroform 4, Soap Liniment 5.

In pruritus Menthol 1, Camphorated Alcohol, Chloroform and Ether of each 3 "dabbed on" lessens irritation.—B.M.J.E. i./10,5.

Menthol-Paraffin Capsules contain a saturated solution of menthol in liquid paraffin. These have elongated ends, which can be torn off, and the contents dropped into the ear to abort boils and to relieve earache.

Mentholeate. Menthol and Oleic Acid *p. æquales.* Heat gently to dissolve. Useful in pruritus, etc., where absorption is desired.

Pastillus Mentholis, T.H., contains $\frac{1}{6}$ grain.

Pigmentum Mentholis.—1 to Olive Oil 4. Painted or injected into the larynx, or even the trachea, useful in phthisis, and laryngeal disease. Also applied on wool for ear affections.

Nebula Mentholis, 0·5 to 2% in liquid paraffin or Olive oil is used for spray or pigment for throat. Relieves acute laryngitis.—Tilley.

Vapor Mentholis Citriodoratus.
Menthol, Eucalyptus Oil (from variety E. *Citriodora*), Eau de Cologne, and Alcohol 90% of each, equal parts.

A little inhaled, *e.g.*, from an Ozonic Inhaler or the handkerchief, valuable for nasal catarrh and influenza.

Unguentum Mentholis (3%) **et Camphoræ** (2%). Hay Fever is well treated by, applied to the nasal passages in small quantity.

Pigmentum Mentholis cum Guaiacol G.N.C. Menthol 1 grain, Guaiacol in crystals 1 grain, Oil of Almonds to 1 ounce.

In acute tonsillitis brushing with Menthol and Guaiacol (10% Menthol and 3 or 4% Guaiacol in Olive Oil) often has a good effect.—Dundas Grant, Pr. Mar. 1912.

Tabellæ Mentholis. *Dose.*—1 or 2, *ad libitum.*
Contain $\frac{1}{5}$ grain menthol, combined with chocolate.

Pilula Mentholis. ½ to 2 grains, Mass with Powdered Soap or half its weight of White Wax previously *just* melted.

Ⓟ**Tinctura Menthol Ætherea,** for local application.
Menthol 1, Purified Ether 4, and Chloroform 4. In neuralgia.

Gossypium Mentholis. B.P.C. 10%. Saturate Cotton Wool 85 with Menthol 10 and Liquid Paraffin 5 in Ether 265 and spread out to dry. Useful to plug the nose in nasal catarrh.

Menthyl Valerianate. ✱VALIDOL. *Dose.*—10 to 15 minims (0·6 to 1 Cc.).

TRADE MARK 216165, registered 1899, renewed 1912. PATENT 3706/1896 became ***void*** in the 13th **year.**—C. D., May 8/15.

The specification contained in the patent method is so exceedingly vague as to lead one to assume that this is not a definite compound, but rather a simple solution of Menthol in Valerianic Acid. (Menthol we find is readily soluble to the extent of 30% in Valerianic Acid.)

In any case it is admitted to be a mixture of Menthol and Menthol Valerianate containing from 10 to 30% of free Menthol. To make true Menthol Valerianate one would avail oneself of one of the customary methods of producing esters, *e.g.*:—

(1) Valerianyl Chloride to interact with Menthol with the application of heat; or

(2) The passage of dry gaseous Hydrochloric Acid into a mixture of Menthol and Valerianic Acid in equivalent quantities to saturation point—the mixture being heated with reflux condenser during the process.

The product to be finally washed free of Hydrochloric Acid.

A colourless liquid with agreeable odour and free from burning taste of menthol. Nerve sedative. Used in sea-sickness.

[P1] MORPHINA. FR. CX.

$C_{17}H_{17}NO(OH)_2,H_2O = 303·263$.

Dose.—$\frac{1}{10}$ to $\frac{1}{3}$ grain (0·006 to 0·02 Gm.).

This, the principal alkaloid of opium, is in a white powder, or in white, shining crystals, insoluble in water and ether. ***Soluble*** in alcohol 90% slightly; glycerin 1 in 150, oleic acid 1 in 10; solutions of its salts are precipitated by ammonia and by potash (but re-dissolved in the latter). It loses about 6% of its weight on drying at 90° C., 3 parts of Morphine are reckoned approximately equal to 4 parts of the Acetate, Hydrochloride, or Sulphate.

Solubility in chloroform by heating at 105° C. is increased.—Dott.

Hydrated Morphine is soluble 1 in 5,200 water at 20° C.

Incompatibility.—Morphine salts are decomposed by alkalis, and solutions are precipitated by vegetable compounds containing tannin, also with iron, lead, manganese, silver, copper, and zinc salts, Liquor Arsenicalis, and potassium permanganate.

The alkalinity of glass bottles (especially colorless) may throw out a very appreciable amount of morphine from a solution of a salt.

Antidotes.—Emetics should first be given and the stomach tube used. Wash out the stomach with Potassium Permanganate Solution; give strong hot coffee, or Ammonia, or Ether, Amyl Nitrite inhalation. Powdered Charcoal in Water *ad lib.* Physiological antidotes are Belladonna and Atropine. $\frac{1}{20}$ grain of the latter antagonises 1 grain Morphine (draw off the urine with catheter frequently). The following have also been given with good effect hypodermically :—Nitroglycerin, Picrotoxin, Pilocarpine, Strychnine. Oxygen inhalation, Saline solution intravenously and Brandy *per* rectum.

Potassium Permanganate as an oxidising antidote for many alkaloidal poisons. Should be used with stomach pump and emetics—more potent than physiological antidotes.—B.M.J. i./12,396.

Morphine Suppository (1 grain) given in place of Glycerin—to infant 4 months, recovery under permanganate per rectum, and syphoned into the Stomach.—B.M.J. i./12,724

Atropine $\frac{3}{10}$ grain in doses of $\frac{1}{10}$ grain at intervals brought recovery where 4 grains of Morphine had been injected.—B.M.J. i./05,1040.

Opium Poisoning treated by Faradic Current.—L. i /12,1120.

Opium and morphine may poison infants through the mother's milk.

Poisoning by apparently 7 grains of Morphine and $\frac{1}{3}$ grain Atropine (combined). Treatment.—Stomach washed out with Permanganate. Injections of Strychnine and bleeding. Death.—B.M.J. i./13,1271.

Flavoring of liquid preparations of Morphine.—Glyl Rosæ, Syl Amygdalæ Amaræ ; Syrupus Aurantii.

Uses of Morphine Salts.—General and most useful sedative and anodyne for all purposes, but may cause indigestion and constipation. Must be given with care to children. Employed in diabetes, but Codeine generally preferred. May be given in renal cases. —For restless painful nights with cardiac dyspnœa. Give a small dose at first.

Hæmoptysis treated by $\frac{1}{6}$ to $\frac{1}{2}$ grain hypodermically.—B.M.J. ii./04,1635,1783. Excellent.—W. W. W.

Puerperal eclampsia well treated.—B.M.J. ii./03,1212.

There is room for a reliable hypodermic hypnotic to replace Morphine, owing to effect on heart or risk of possible paralysis of the intestines with this.—B.M.J. i./07,1036.

Acute uræmia occurring with a chronic parenchymatous nephritis cured by Morphine and Atropine. The urine was almost solid with albumin. Venesection and Oxygen also employed.—A. H. Carter, B.M.J. ii./12,1181.

Mania treated by $\frac{1}{2}$ grain dose with chloroform in addition. The two together produce deep sleep lasting several hours. Either alone is comparatively of little avail.—B.M.J. ii./08,197.

For children. Contrary to usual opinion, experience in more than 300 cases showed that Morphine is well tolerated by the young. It is preferable to the various Opium preparations. The initial dose is 1/10 milligramme per kilo of weight hypodermically. In children of 8 to 12 years 0·005 to 0·01 Gm. of Morphine Hydrochloride with Atropine was given. No bad results.—P.J. ii./12,810.

Morphine Tablets under the tongue instead of $\frac{1}{2}$ grain hypodermically found unsatisfactory on the "Tiger" in the Jutland Battle.—B.M.J. ii./16,597.

In **Morphine Habit,** Sparteine Sulphate is recommended to gradually replace the Morphine solution, commencing with $\frac{1}{2}$, increased to $\frac{2}{3}$ grain, four to six times a day. Sodium Bromide and Nitroglycerin Tablets are useful, *q.v.* Camphor has been given to relieve the craving ; also Heroin and Dionin.

Gamgee on chronic morphinism and its treatment. For the insomnia o morphinism give Veronal, for the circulatory and respiratory troubles give full doses of Digitalis Tincture, repeated hypodermic Strychnine ($\frac{1}{80}$ grain) injections and cupping glasses to the region of the heart. For the gastric catarrh Bismuth Carbonate (as much as 5 Gm.) first thing in the morning, with directions to change resting position as is done in treatment of gastric ulcer. —L. ii./08,796.

O. Jennings uses Turkish baths, heart tonics and Sodium Bicarbonate, *e.g.*, as Vichy Water, with gradual weaning from the Morphine by the patient himself. With these exceptions, 'drugs,' especially hypnotics, should be little used. The habit can be "knocked out" in a relatively short time by Hyoscine and Atropine. Sparteine useful, also Bromide.—B.M.J. ii./11,812, L. ii./11,506.

A combined medicinal and hypnotic treatment for nine weeks in a home:—During the first three days give a diminishing number of injections, of decreasing strength. Before each, patient should receive Sodium Bromide 5 Gm. By the end of the third day both Bromide and Morphine are stopped, and the patient will be in a comatose or semi-comatose condition lasting from three to six days more. He should be roused to take milk at regular intervals. When the effects of the Bromide begin to pass off there will be in all probability a certain amount of mental confusion, including hallucinations and delusions of persecution. These will soon pass off. When the patient appears to be sufficiently sensible, efforts should be made to hypnotise him, and his lethargic state will materially assist in this. Suitable suggestions must be made without waste of time, lest the craving should reassert itself before the mind is sufficiently influenced. This is the critical point of the whole cure. As soon as possible patients should be brought into one room and hypnotised collectively. During this period, from the second to the end of the seventh week, each patient should be strictly supervised, and no access to drugs allowed. During the eighth and ninth weeks he should be allowed to keep his morphine and syringes. The hypnotic sittings should be reduced in number, and should have special reference towards teaching the patient to put himself to sleep. Once acquired, this power would serve to give the patient in the future a ready refuge from worry or pain or anything else that might otherwise lead to thoughts of Morphine.—B.M.J. ii./10,1595,2007.

Morphinomania cured by Hyoscine. A severe case in which patient was taking 6 to 10 grains of Morphine Sulphate daily, and on one occasion 12 grains in 24 hours, cured by Hyoscine. During 8 days the patient had in all Hyoscine Hydrobromide 47/200 grain, Morphine $1\frac{1}{4}$ grains, Sodium Bromide 270 grains and Syrup of Chloral 20 drachms.—W. K. Anderson, Pr., June, 1912, per Pres., Oct., 1912, p. 255.

Morphine habitues and effects of military service in France. Morphinistes may be good fighters if allowed an adequate supply. —L. ii./15,139.

Morphine in China. Unsatisfactory conditions of the Customs regulations and absence of adequate pharmacy law.—G. L. Tuck, L. i./17,874. *See also* Opium, abuse of.

P1 **Oleatum Morphinæ.** Morphine 1, Oleic Acid 60. Dissolve. Oleic acid will dissolve as much as one-tenth of its weight of pure morphine. Morphine is added to oleate of mercury to relieve pain.

P1 **Morphinæ Acetas,** Morphine Acetate (*Off.*)

$C_{17}H_{19}NO_{3}, C_2H_4O_2, 3H_2O = 399{\cdot}337.$

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (0·008 to 0·03 Gm.), which may be increased.

A white powder, *soluble* 1 in $2\frac{1}{2}$ of water, also about 1 in 100 in Alcohol 90%, Glycerin 1 in 5.

P1 **Injectio Morphinæ Acetatis Hypodermica,** *Martindale.*

1 grain in 6 minims. *Dose.*—1 to 2 minims.

Dissolve the Morphine Acetate in freshly boiled distilled water in the above proportion. Two or three drops of Acetic Acid (*Off.*) may be necessary if the morphine salt be not very fresh. Thus made a bottle of the injection has kept in good condition for a long time. Sulphurous Acid 1 minim to the ounce will prevent the slight darkening which will ultimately occur. A few drops of glycerin added will prevent the salt incrustating on lip of the bottle.

On account of the small quantity of liquid, this injection (1 *grain in* 6 *minims*) is preferred. **Caution.**—Carefully distinguish this from the B.P. 1898 injection, Morphine Tartrate (1 *grain in* 22 *minims*), and the *Off.* (1914) injection which is 1 *grain in* 44 *minims.*

P1 **Injectio Morphinæ et Atropinæ Hypodermica**, *Martindale.* Contains Atropine Sulphate 1 grain in 3 drachms of Injection of Morphine Acetate (1 grain in 6 minims).

Dose.—1 to 3 minims, 3 minims contain half a grain of morphine acetate and $\frac{1}{60}$ grain of atropine sulphate. The atropine increases the sedative action and counteracts the disagreeable effects of the morphine on the head, stomach, and bowels.

P1 **Ophthalmic Discs** are made containing $\frac{1}{500}$ grain **Morphine** and $\frac{1}{500}$ grain **Morphine** with $\frac{1}{5000}$ grain **Atropine** respectively.

P1 ***Liquor Morphinæ Acetatis** (*Off.* and B.P. 1898).

Dose.—10 to 60 minims (0·6 to 4 Cc.).

Morphine Acetate 1, Diluted Acetic Acid 2, Alcohol (90%) 25, Distilled Water to 100.

Ⓟ **Pastillus Morphinæ Acetatis** ($\frac{1}{30}$ gr.), *v.* Pastilli.

Ⓟ **Pastillus Cocainæ** ($\frac{1}{15}$ gr.) **et Morphinæ** ($\frac{1}{30}$ gr.).

P1 **Morphinæ Hydrobromidum.**

$C_{17}H_{19}NO_3.HBr.2H_2O = 402{\cdot}207.$

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (0·008 to 0·03 Gm.).

A white powder, soluble 1 in 22 of water and about 1 in 50 alcohol 90%. Given with hydrobromic acid as sedative, affects the head less.

P1 **Morphinæ Hydrochloridum.** (*Off.* and B.P. 1898). U.S., Fr. Cx.,

$C_{17}H_{19}NO_3HCl.3H_2O = 375{\cdot}763.$

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (0·008 to 0·03 Gm.), which may be increased.

In silky white crystals or in powder soluble 1 in 25 of water, about 1 in 67 of alcohol 90% (by expt.), and about 1 in 8 of Glycerin.

P1 **Guttæ Morphinæ et Cocainæ (Aural), G.N.C.** Cocaine Hydrochloride 24 grains, Morphine Hydrochloride 4 grains, Glycerin 1 drachm, Distilled Water to $\frac{1}{2}$ ounce. *N.B.—A potent preparation.*

Ⓟ **Linctus Morphinæ, U.C.H.**

Solution of Morphine Hydrochloride 3 minims, Chloroform Emulsion 3 minims, Treacle 60 grains, Water to 1 drachm. May be more agreeably flavoured with syrup of lemon.

Dose.—A teaspoonful 3 or 4 times a day ; repeated frequently when cough is troublesome. Taken undiluted, swallowed very slowly. *For children* of 8 to 14 years, dose 10 to 20 drops. Not suitable for very young children, or where there is difficulty of expectoration in bronchitis.

Ⓟ **St. M.'s H.** has Morphine Hydrochloride Solution 10 minims, Honey $\frac{1}{2}$ drachm, Water to 1 drachm.

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* This may be debated, but it would be reasonable to treat as P1

Ⓟ**Linctus Morphinæ, C.X.**
Solution of Morphine Hydrochloride 2 minims, Spirit of Chloroform 2 minims, Ipecacuanha Wine 2 minims, Mucilage of Acacia $\frac{1}{2}$ drachm, Water to 1 drachm.

Ⓟ**Linctus Morphinæ Hydrocyanicus** (Ogle's Drops), St. G. H.
Dilute Hydrocyanic Acid 1 minim, Solution of Morphine Acetate 3 minims, Oxymel of Squills to 1 drachm.

P1**Guttæ Rosæ.**
Dose.—2 to 10 minims (0·12 to 0·6 Cc.).
Morphine 1, Citric Acid 0·5, Cochineal Tincture 8, Water to 50. For cough,—a useful name and method of giving the drug.—Ph. Notes (Denmark, modified).

Ⓟ**Mistura Morphinæ et Phenazoni Composita,** *Martindale.*
Dose.—1 ounce (30 Cc.).
Solution of Morphine Hydrochloride 10 minims, Phenazone 10 grains, Tincture of Castor 20 minims, Spirit of Chloroform 10 minims, Syl Lavandulæ 1 drachm, Mucilage and Water to 1 ounce.
This is virtually a specific for spasmodic dysmenorrhœa.—W.W.W.

Ⓟ**Mistura Tussi Rubra.** *Dose.*—$\frac{1}{2}$ to 2 drachms (2 to 8 Cc.) in a little water. Hydrobromic Acid 5 minims, Morphine Hydrobromide $\frac{1}{32}$ grain, Diluted Hydrocyanic Acid $\frac{1}{8}$ minim, Spirit of Ether 5 minims, Tincture of Cudbear 5 minims, Syrup to 1 drachm. This forms a popular winter-cough mixture.

P1***Liquor Morphinæ Hydrochloridi** (*Off.* and B.P. 1898).
Dose.—10 to 60 minims (0·6 to 4 Cc.).
Morphine Hydrochloride 1, Diluted Hydrochloric Acid 2, Alcohol (90%) 25, Distilled Water to 100.
The Hydrochloric Acid is excessive and 20% of alcohol would be enough.—D. B. Dott, P.J. i. 15,206.

P1**Soluté de Morphine chlorhydrate pour injection hypodermique**
Fr. Cx. 2%.

Ⓟ**Mistura Anodyna, N.H.W.**
Solution of Morphine Hydrochloride 20 minims, Sal Volatile $\frac{1}{2}$ drachm, Water to $\frac{1}{2}$ ounce.

Ⓟ**Pulvis Morphinæ Effervescens.**
Dose.—1 or 2 of the following during the day. Morphine Hydrochloride $\frac{1}{5}$ grain, Potassium Bromide 10 grains, Antipyrin 10 grains, Citric Acid 40 grains, Tartaric Acid 40 grains, Sodium Bicarbonate 1 drachm, Lactose 1 drachm. For one effervescent powder. Very serviceable in dental neuralgia.—M.P., July 21/09,68.

P1 **Suppositoria Morphinæ.**
Morphine Hydrochloride $\frac{1}{4}$ (*Off.*) also $\frac{1}{2}$, 1, $1\frac{1}{2}$, and 2 grains (taking weight of the suppository as 15 grains).

P1**Tablets, Hypodermic,** contain $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{2}$ and 1 grain.

Trochisci Morphinæ et Emetin *v.* Emetin.

Ⓟ**Trochisci Morphinæ et Ipecacuanhæ** (*Off.*).
Contain $\frac{1}{32}$ grain (0·002 Gm.) of Morphine Hydrochloride, with $\frac{1}{10}$ grain (0·006 Gm.) of Ipecacuanha in each. Useful to allay cough.

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* See note to Liquor Morphinæ Acetatis. Same remark applies.

P1 **Morphinæ Hypophosphis.**
$C_{17}H_{19}NO_3.HPH_2O_2$ = 351·311. *Dose.*—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).

A white powder *soluble* 2 in 1 (by expt.) of water and about 1 in 14 of Alcohol. Should be a very useful salt for injection owing to its great solubility.

P1 **Hypodermic Tablets** contain $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 grain.

P1 **Morphinæ Meconas,**—MORPHINE MECONATE. *Syn.*—incorrectly MORPHINE BIMECONATE. (Solid Bimeconate is impossible.)
$(C_{17}H_{19}NO_3)_2C_7H_4O_7+5H_2O$=860·641.
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).

This, one of the natural salts of morphine in opium, is in white minute acicular crystals, soluble in 1 in 34 of water. It is said to disturb the head less as well as to derange the stomach less, than the other salts.

Ⓟ **Liquor Morphinæ Bimeconatis.**
Dose.—5 to 40 minims (**0·3 to 2·4 Cc.**).

Morphine (pure Alkaloid) 14½ grains, Meconic Acid 12 grains, Alcohol (90%) 1 ounce. Mix and add Distilled Water to 4 ounces. Filter. One ounce contains about 6·3 grains or 1·45% (*w/v*) of morphine bimeconate. It is about the same strength as tincture of opium.

P1 **Pills** contain $\frac{1}{4}$ grain.

P1 **Tablets, Hypodermic**, contain $\frac{1}{8}$ and $\frac{1}{4}$ grain.

P1 **Morphinæ Sulphas,** $(C_{17}H_{19}NO_3)_2H_2SO_4 + 5H_2O$ = 758·65.
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).

In white silky acicular crystals. Soluble 1 in 23 of water, very slightly in alcohol 90%.

P1 **Hypodermic Tablets** contain $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 grain; also combined with **Atropine** as follows :—

Morphine Sulphate	$\frac{1}{8}$,	$\frac{1}{8}$,	$\frac{1}{6}$,	$\frac{1}{4}$,	$\frac{1}{4}$,	$\frac{1}{3}$,	$\frac{1}{2}$,	$\frac{1}{2}$ gr.
Atropine Sulphate	$\frac{1}{200}$,	$\frac{1}{150}$,	$\frac{1}{180}$,	$\frac{1}{200}$,	$\frac{1}{150}$,	$\frac{1}{120}$,	$\frac{1}{120}$,	$\frac{1}{100}$ gr.

Morphine $\frac{1}{4}$ grain and Atropine $\frac{1}{120}$ grain used with advantage, 20–30 minutes before the anæsthetic in operations, particularly in abdominal cases.—L. i./10,624.

P1 **Sterules, Hypodermic,** of **Morphine Sulphate** contain $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain (**0·008, 0·01, 0·016 and 0·03 Gm.**).

Morphine and Atropine to be given before anæsthesia effected by gas and ether to lessen the amount required and to minimise the secretion from the mouth and lungs.—Annus Medicus, L. ii./09,1898.

Hypodermic Injection of Morphine for use in Warfare.

A wide-mouth bottle, 1 ounce capacity, is capped by a double layer of rubber, *e.g.*, pieces of a tobacco pouch. The syringe needle passed through obliquely can be withdrawn, whilst the aperture will close again and keep the solution ($\frac{1}{6}$ grain of Morphine Sulphate in 5 minims) clean. Use amber bottle free from alkali, or Morphine will deposit.—B.M.J. ii./10,432.

$\boxed{\text{P1}}$ **Hypodermic Tablets of Morphine Hydrochloride $\frac{1}{6}$, Atropine Sulphate $\frac{1}{200}$, and Nitroglycerin $\frac{1}{200}$** grain. In the treatment of asthma.—Pr. Oct. 1910.

$\boxed{\text{P1}}$ **Morphinæ Tartras, Morphine Tartrate.**
$(C_{17}H_{19}NO_3)_2.(CH.OH.COOH)_2, 3H_2O = 774{\cdot}61$.
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).

In small white nodular tufts of acicular crystals, readily soluble 1 in 10 of water, slightly in alcohol 90%.

$\boxed{\text{P1}}$ **Injectio Morphinæ Hypodermica** (*Off.*).
Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**).

Contains 2·5% of Morphine Tartrate (1 grain in 44 minims). Caution.—B.P. '98 was 5%.

$\boxed{\text{P1}}$***Liquor Morphinæ Tartratis** (*Off.* and B.P. 1898).
Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

Morphine Tartrate 1, Alcohol (90%) 25, Distilled Water to 100.

$\boxed{\text{P1}}$ **Ethyl-Morphine Hydrochloride,** P. HUNG., SVEC.
✱ **Dionin** (TRADE MARK 217175/1899, renewed 1912).
$C_2H_5C_{17}H_{18}NO_3.HCl.H_2O = 367{\cdot}773$.

Manufacture.—According to Von Mering's Patent (No. 13,703 of 1899), Morphine is dissolved in alkali. Caustic Soda or Sodium is added in calculated quantities and then Ethyl Bromide, *q.s.* The mixture is heated for 1 to 2 hours at 80 to 100° C. Merck's Patent 14,366 of 1901 deals with the same subject.

It may be prepared by heating Morphine with Sodium Ethylate 1 molecule and Ethyl Iodide 1 molecule.—Beilstein III., 908 (674).

We would suggest dissolving Morphine 1 molecule in Ethyl Alcohol and heating with a molecular proportion of Sodium Hydrate and a molecule of Ethyl Iodide in Ethyl Alcohol as solvent at about 60° C. in a closed vessel until interaction is complete, finally extracting with Ether and then converting the base into the Hydrochloride.

As an alternative Ethyl Sulphate in the presence of Alcohol and Sodium suggest themselves—on the lines of Merck's patent for making Codeine (D.R.P. 102,634).

British made Ethyl-Morphine has been available for some years past. We have no actual experience with the body.

Dott finds $2H_2O$ in the compound. Morphine contains one alcoholic and one phenolic OH. In this body the H of the phenolic OH is replaced by C_2H_5.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**). Maximum dose in 24 hours, $1\frac{1}{2}$ grains.

A white crystalline powder ***soluble*** 1 in 10 to 11 of water (*c.f.*P.J. i./12,425) and 1 in 25 of alcohol 90% (by experiment). M.pt. is ill-defined. The temperature 124° C. usually given is too high for the fully hydrated salt and too low for the salt dried at 115° C.—Dott. Insoluble in ether. Recommended to replace codeine and morphine in bronchitis, pulmonary emphysema, and bronchial asthma, also for whooping-cough and for morphine habit. May be used *hypodermically* in doses of $\frac{1}{10}$ grain in 5 minims of water.

A useful anodyne in glaucoma, iritis, corneal ulcers, etc. Solutions may be from 1 to 5% strength or more.

May cause "ophthalmic fireworks," pain, chemosis, swelling, and sneezing Corneal ulcers have been cured by it.—M.P. Aug. 1905 : B.M.J. i./06.1098.

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* See Note to Liquor Morphinæ Acetatis. Same remark applies.

In interstitial keratitis with potassium iodide internally, and yellow precipitate ointment in the conjunctival sac.—B.M.J. ii./04,1303.

Ⓟ**Guttæ Dionin** R.O.H. 1, 2, 5 or 10%.

Ⓟ**Sterules** (Ophthalmic) **of Dionin** contain 5% Solution.

Ⓟ**Sterules, Hypodermic of Dionin** contain $\frac{1}{6}$ grain (**0·01 Gm.**).

P1 **Ethyl-Morphine** (Base), has no distinct M.pt. It is soluble about 1 in 500 Water and 1 in $1\frac{1}{2}$ Alcohol at 25° C.—Y.B.P., 1913,20.

P1 **Diamorphinæ Hydrochloridum.** *Syn.* **Diaphorm** (*Martindale*), **Diacetyl-Morphine Hydrochloride, P. Jap.**

✱**Heroin** (T.M. 215326 and 322540) **Hydrochloride** $C_{17}H_{17}(OCH_3.CO)_2NO.HCl$. = 405·767. (*Off.* + H_2O). The Hydrogen atoms of both the alcoholic and the phenolic OH groups are replaced by the $CH_3.CO$ groupings. M.pt. about 230° C. Aqueous solution must not colour blue with Ferric Chloride (absence of Morphine).

This body was first produced in London by Beckett and Wright.

Dose.—$\frac{1}{25}$ to $\frac{1}{8}$ grain (**0·0025 to 0·008 Gm.**). Maximum dose in 24 hours (P.G.) 0·015 Gm.

In white crystalline powder, ***soluble*** about 1 in $2\frac{1}{2}$ of water and about 1 in 13 of alcohol 90% (our experiments). ***Incompatibles***—Both alkalis and acids and other chemicals as morphine.

Uses.—Sedative for cough, *e.g*, in phthisis, bronchitis, also in asthma. Has been given in hæmoptysis. Lengthy use must be guarded against. Useful in acute coryza.

In hay-fever the following has been recommended: Heroin $\frac{1}{12}$ grain, Atropine Sulphate $\frac{1}{200}$ grain, Caffeine Citrate 1 grain, Salophen 5 grains. In cachet, one every four hours.

Recovery after 9 grains.—B.M.J.E. ii./02,31.

In bronchitis, early stages of, and in laryngitis frequently occurring in influenza, will relieve cough and so induce sleep. May well be prescribed with a small dose of hydrocyanic acid.—Pr. 1907, p. 663.

J. C. McWalter says it is less toxic than morphine, but not 4 times as strong in action—*c.f.* B.P. doses—$\frac{1}{8}$ grain as against Morphine $\frac{1}{2}$ grain

Flavoring.—*Vide* Morphine.

Ⓟ**Tablets, Hydodermic,** $\frac{1}{24}$ and $\frac{1}{12}$ grain.

Ⓟ**Tabellæ** $\frac{1}{10}$ grain, in chocolate basis for administration *per os*.

P1 **Morphinum Diacetylicum, P. Austr.** *Syn.* ACETO-MORPHINE. The base of the above salt. Slightly soluble in water.

Ⓟ**Glycaphorm.** *Syn.* GLYCEROLE OF DIACETYL-MORPHINE HYDROCHLORIDE, LINCTUS HEROIN, SYRUPUS HEROIN.

Contains $\frac{1}{48}$ grain Diacetyl-Morphine Hydrochloride in 1 drachm of a vehicle consisting of Glycerin 3, Syrup of Roses 4, Water 1.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

This preparation forms a useful linctus for coughs, and is employed in bronchitis, pertussis, laryngitis, asthma, and similar disorders.

Ⓟ**Glyco-Heroin.** *Syn.* **Glykeron.**

Dose.—1 drachm (**4 Cc.**) (= $\frac{1}{16}$ grain of Heroin) repeated; children of 10 or more years 15 to 30 minims (**1 to 2 Cc.**) or less. A proprietary article. Is given for coughs, asthma, pneumonia, bronchitis, etc.

$\boxed{P1}$ **Morphine-Methyl Bromide.** *Syn.* MORPHOSAN.
$C_{18}H_{22}NO_3Br.H_2O = 398{\cdot}212$.
Dose hypodermically, ⅛ to ¼ grain (**0·008 to 0·016 Gm.**)
White needles soluble 1 in 20. Comparatively with Morphine it is non-poisonous—it is thought to be 10 times less potent.

Uses.—In epilepsy, also for use with Scopolamine *q.v.* as anæsthetic.

✱**Lodal** (T.M. 313694). Prepared by oxidising Laudonosine (*vide Vol. II.*) is used to contract the uterus in *dose* 1 grain thrice daily by the mouth.—B.M.J. ii./10,84.

$\boxed{P1}$ **Papaverine.** $C_{20}H_{21}O_4N = 339{\cdot}278$. An alkaloid of Opium (0·5 to 1%). M.pt. 147° C. Easily soluble in hot alcohol, but with difficulty in the cold.

$\boxed{P1}$ **Papaverine Sulphate.** $(C_{20}H_{21}O_4N)_2H_2SO_4 = 776{\cdot}632$.
Dose.—½ to 1¾ grains (**0·03 to 0·11 Gm.**) *per os* or hypodermically up to 8 grains (**0·5 Gm.**) in a day.

A white crystalline powder soluble 1 in 2 in water—by expt.—W. H. M. It is said to be non-toxic in single doses of even 1 Gm.

A rather feeble central analgesic and a local anæsthetic. Does not induce a habit like morphine. In all kinds of gastric and intestinal spasms (also for the diagnosis of pyloric spasm); in biliary colic; and in bronchial spasm. Of more doubtful value in pertussis, hyperemesis, and vascular spasm—angina pectoris, acute uræmia, and eclampsia. The local anæsthetic action, with vasodilatation, has been used against rhino-asthma, and to mitigate the pain of irritant injections.—Pal, Jl. American Medical Association.

Papaverine has a Strychnine-like action which is missing in its methochloride and reappears in its reduction product Laudanosine.—F. L. Pyman, L. ii./17 924.

Ureteral Calculus treated by Papaverine. In the case of a man aged 72, after catheterisation and injection of oil had failed 5 Cc. of 2% solution Papaverine Hydrochloride were instilled through a catheter and six days later 5 Cc. of 2% Papaverine Sulphate Solution. Stone was removed from floor of bladder with Young's rongeur. In another case of a man aged 40, ten days after instilling 5 Cc. of the Papaverine Hydrochloride Solution fragment of stone was dislodged and recovered in bladder washings. Papaverine Sulphate Solution was again instilled and the following day the stone was produced in the urine. In a further case of a man 33, withdrawing catheter to a point just above obstruction, 3 Cc. of the Hydrochloride Solution were instilled and the stone was expelled a few days later per urethra. Striking feature in these cases was the absence of renal colic following the use of Papaverine. It is non-toxic in the dosage employed. Both sulphate and hydrochloride were prepared from the alkaloid Papaverine and two per cent. solutions of each made up. No difference was noted in the action of these two solutions; *the sulphate is much more soluble and therefore recommended for use.* The action is unquestionably due to the analgesic properties of the alkaloid and its effect in overcoming spasms of the ureter.—H. A. Fowler, Annals of Surgery (U.S.A.) May, 1917.

Combination of Narcotic Drugs.

It has been shown that combinations of Narcotic Drugs may be more potent than would be expected by taking the sum of the two substances, *e.g.*, in the case of Codeine Diethylbarbiturate + Sodium Diethylbarbiturate. In other instances by adding a weak substance to a potent narcotic, marked increase in narcotic power occurs. (The maximum effect, according to Straub, in the case of Morphine + Narcotine only occurs with certain proportions.)

The same exists in the case of the naturally occurring Opium Alkaloids. A mixture of all the alkaloids of Opium has a narcotic effect not only greater than the Morphine in it will account for, but much greater than a summation of the effects of the different alkaloids would lead one to expect.—B.M.J.E. i./13,84.

Morphine Meconate is stated to be 25% stronger than the equivalent dose of Morphine Hydrochloride—due to the action of the Meconic radical.

Burgi's Theory is as follows :—

Drugs having the same physiological action summarise their therapeutic effect when given together, but drugs of different pharmocological action given together increase their activity markedly more than the sum of their action when given separately—they probably act on different cells. Thus Morphine, Codeine, Heroin, and Thebaine give results equal to the sum of their effects, but combined doses of Morphine, Narcotine, and Papaverine are 20 to 50% more toxic than the same doses separately.—P.J. i./13,460.

The word **Synergism** has been adopted to indicate the action of one drug in enhancing the effect of another.—P.J. i./13,400.

Ⓟ **Codeonal.** *Dose.*—Two 2½ grain Tablets in the evening.

Wholesale and retail vendors must label ' Poison ' and treat otherwise as Ⓟ, *or indeed it should be regarded as a salt of a vegetable alkaloid, i.e.,* $\boxed{\text{P1}}$.—W. H. M.

A combination of Codeine Diethylbarbiturate (2 parts) with Sodium Diethylbarbiturate (15 parts).—L. ii./12,1161.

It appears that Codeine is the only Opium alkaloid that can form this combination. ***Soluble*** about 1 in 30 of water.

Uses.—Hypnotic, in disease of the nervous system and pulmonary disorders. It takes effect after about half an hour.

$\boxed{\text{P1}}$ **Morphine Narcotine Meconate.** *Syn.* ★**Narcophin** (T.M. 341895.) Patents : (Nos. 13293, of 1912.—P.J. ii./12,395 ; i./13,299 ; and 3402 of 1913, P.J. ii./13,734). The former is paid up for the 7th year ; the latter became void in 4th.

Dose.—⅓ to ½ grain (**0·02 to 0·03 Gm.**).

The compound made by dissolving Narcotine. Morphine and Meconic Acid in equimolecular proportions in Alcohol and precipitating with Ether contains slightly more Morphine and Meconic Acid and slightly less Narcotine and Water than required by the formula $C_{17}H_{19}NO_3.C_{22}H_{23}NO_7.C_7H_4O_7.4H_2O$. The slight excess of Acid makes the body easily *soluble* in water. A mixture of the constituents in powder form in molecular proportions is not perfectly soluble. The discrepancies are therapeutically not serious.—D. B. Dott, P.J. i./13,99.

Uses.—Hypnotic. It is similar in action to Morphine and Scopolamine and is used where Morphine is employed, also where Morphine alone is inadmissible (diseases of organs of respiration, etc.).

It is stated that the paralysing action of Morphine on the respiratory centre is lessened greatly by adding an equal quantity of Narcotine. In the case of mice the toxicity of the two together is so small as to be hardly measurable. The most increase in narcotic effect is obtained by using equal weights.—B.M J.E. i./13,84.

MULLS.

Anserine Mulls.

These consist of **Medicated Ointments** prepared with a basis of **Goose Grease (Oleum Anseris)** depurated and benzoated, spread on calico Bandages. They are prepared 4 and 7½ inches wide by 1 yard.

It has been shown (B.M.J. i./12,238) that goose fat possesses the *highest penetrating power* amongst absorbent ointment bases.

Medicated Anserine Mulls for treatment where rapid and thorough absorption into the tissues is required, are made :—

Acid Boric 10%	**Ferric Oleate** 5%	**Oleum Rusci** 5%
Acid Carbolic 2%	**Ichthyol** 10%	**Potassium Iodide** 10%
Betanaphthol 5%	**Iodine** 2%	**Scarlet Red** 4%
Chrysarobin 2%	**Mercury** 10%	**Sulphur** 10%
	Thiosinamin 5%	

Adepsine Mulls are bandages similar to the above, but prepared with Benzoated Lard basis. This basis is suitable where deep penetration into the skin is not so essential, *e.g.*, **Adepsine Mulls** :—

Acid Boric 10 and 20%	**Resorcin** 5%
Acid Carbolic 2 and 4%	**Thorium Oleate** 25%
Acid Salicylic 5 and 10%	**Zinc Oxide** 10%
Bismuth Carbonate 20%	**Zinc Oxide** 20% **Ichthyol** 10%
Calamine 10%	**Zinc Oxide** 20% **Calamine** 5%
Cupric Oleate 10%	
Liquor Carbonis Det. 10%	
Menthol 5%	

Plaster-Mulls of soft rubber adhesive plaster basis, spread on cotton cloth.

NO.			NO.		
2	Acid Boric	40*	88	Ⓟ Hydrarg. Acid. carbol. Hydrarg. perchlor Zinci oxidum	30* 15 4 15
4	,, Carbolic	15	204	Ichthyol	40
9	Acid salicyl.	50	7	Pyrogallol	40
64	Acid. salicyl. Ext. cannab. ind.	40 10	231	Thiosinamin	40
76	Ac. salicyl. Creosote	20 40	24	Zinc ox.	45
6	Chrysarobin	15	74	Zinc ox. Ichthyol	35 17
15	Hydrarg.	55			
16	Hydrarg. Acid. carbol	55 15			
17	Hydrarg. Zinc Oxide	30 7½			

Plasters, Rubber, white adhesive containing a proportion of Zinc Oxide spread on pink cotton. They are 2½, 3¾ and 5 Cm. wide, in spools.

NAPHTHOL.

Beta-Naphthol (*Off.*). U.S., Fr. Cx., **P. Belg., P. Austr.** $C_{10}H_7OH = 144{\cdot}114$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).) in cachet. Fr. Cx. *Max. single dose* 15 grains; Max. dose during 24 hours 45 grains approximately.

Manufacture.—

β-Naphthol is prepared by heating Naphthalene (which is obtained by cooling the 180° to 220° C. fractions of the distillation of coal tar) with strong Sulphuric Acid at 170° to 180° C., β-Naphthalene Sulphonic Acid $C_{10}H_7SO_3H = 208{\cdot}174$ being formed. This is converted firstly into the Calcium $(C_{10}H_7SO_3)_2Ca = 454{\cdot}422$ and then the Sodium Salt, $C_{10}H_7SO_3Na = 230{\cdot}166$. By treatment at 300° C. with Sodium Hydroxide this is converted into Sodium Naphtholate, $C_{10}H_7ONa = 166{\cdot}106$, which is ultimately decomposed with Hydrochloric Acids forming β-Naphthol and Sodium Chloride.

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* Percentage of medicament. Note Acid Salicylic is also made 30, 25, 20, 15 10 and 5%.

β Naphthol has a faint Storax odour; when sublimed it is in white shining laminar crystals; *soluble* in alcohol 1 in 2, ether 3 in 4, chloroform 1 in 24, and 1 in 24 benzol; 1 in 12 of olive oil and lard, and 1 in 80 of vaseline. Addition of boric acid increases solubility in water.

Incompatible with Camphor, Ferric Chloride, Menthol, Phenazone and Phenol.

Uses.—Internally, in enteric fever; safe and efficient, but sometimes causes too much gastric disturbance. In dilated stomach, dyspepsia and other disorders. In cholera, as preventive, and in treatment of early stages; and used as a vermifuge.

It is a powerful antiseptic and germicide. In advanced scabies, an ointment of 10 to 15% cures the eczema as well as destroys the parasite, but the **Compound Ointment L.H.** (Kaposi's Ointment) is preferred.—Naphthol 15, Lard 100, Green Soap 50, Prepared Chalk 10. Useful also in psoriasis.

β-Naphthol 5, Alcohol 100, Glycerin 10, is a remedy for hyperidrosis of palms, soles, and axillæ.

In kidney disease β-Naphthol is contraindicated. Ankylostomiasis treated by 30 grain doses caused poisoning. Thymol may be safer.—W. B. Orme.—B.M.J. ii./15,176.

Pills and Tablets, β-Naphthol 3 and 5 grains, are prepared.

Tablets of Betanaphthol 5 grains (**0·3 Gm.**) **with Phenolphthalein** 3 grains (**0·2 Gm.**).

To combat ankylostoma infection. A useful combination.

Charbon Naphtholé. *Dose.*—60 to 120 grains. A granular preparation of wood charcoal, containing 5% β-naphthol, for use in ailments of the stomach and intestines.—Ph. Notes, Greece.

α-Naphthol $C_{10}H_7.OH$ = 144·114 is said to have greater antiseptic power, but given internally causes more irritation.

Manufacture.—This is also made from Naphthalene on similar lines. The principal 'tip' is that the sulphonation must be conducted at a *very low* temperature.

A solution of 1 in 3,500 of water is used to wash out the intestines by rectal injection.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) but larger doses are given. M. Am. says: antifermentative 30 grains in 1 ounce Castor Oil, given in 2 portions within 2 hours. In typhoid fever 45–90 grains per diem.

Benzonaphthol.—*Syn.* **Benzoyl-Naphthol.** Beta-Naphthol Benzoate, Fr. Cx. $C_{10}H_7OOC:C_6H_5$ = 248·181.

Dose.—4 to 10 grains (**0·25 to 0·6 Gm.**) in cachet or suspended in mixture.

Manufacture.—Add Benzoyl Chloride 140 to finely powdered β-naphthol 144. Then heat to 125° C. ½ hour and pour the liquid into equal volume of water. Filter off and recrystallise (*twice*) from Alcohol, and wash with water.—M.Pt. 110° C.

A white crystalline powder. Soluble in alcohol and chloroform, almost insoluble in water. An intestinal antiseptic and diuretic, *e.g.*, in typhoid. May be combined with bismuth salicylate. Externally is used 3 to 10% in ointments. **Tablets**, 5 grains, to be crushed and taken in a little water.

Betol. *Syn.* **Naphthalol, Betanaphthol Salicylate.** FR. CX.
$C_6H_4OH.CO.OC_{10}H_7 = 264·181$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) in cachets or pills, or suspended in almond emulsion or milk.

Manufacture.—It is generally directed to heat Sodium Salicylate and *B*-Naphthol-Sodium with Phosphorus Oxychloride on the lines of making Salol. The reaction which takes place is as follows :—

$$2C_6H_4OH.COONa + 2C_{10}H_7ONa + POCl_3 = 2C_6H_4OH.COOC_{10}H_7 + 3NaCl + NaPO_3$$

The compound is washed and recrystallised from Alcohol.

We did not find this method satisfactory, but by using Beta Naphthol and Sodium Salicylate the process is better, the yield however is poor—only about 60% of theory.

The quantities employed are Beta Naphthol 144, Sodium Salicylate 168, and Phosphorus Oxychloride 80. The Beta Naphthol and Sodium Salicylate are intimately mixed and the Phosphorus Oxychloride added with trituration. When solid the mixture was transferred to a flask and heated until Hydrochloric Acid ceased to be evolved. Recrystallise from spirit. Melting point 95° C.

The equation would be :—

$$2C_{10}H_7OH + 2C_6H_4OH.COONa + POCl_3 = 2C_6H_4OH.COOC_{10}H_7 + NaPO_3 + NaCl + 2HCl$$

The substance is not soluble to any extent in Sodium Hydrate solution which is remarkable as it contains a Phenolic Hydroxyl group.

In small tasteless white crystals, insoluble in water, soluble in alcohol. Useful in rheumatism, cystitis, and intestinal catarrh.

Cachets of Betol and Bismuth Salicylate, 5 grains each, useful as an intestinal disinfectant. Contra-indicated in renal disease.

Naphthalene. $C_{10}H_8 = 128·114$.

Dose.—2 to 15 grains (**0·12 to 1 Gm.**) in cachets.

A hydrocarbon formed in the manufacture of coal gas. In white crystalline plates (M.pt. 80° C.) with persistent odour.

Soluble in Ether 1 in 3, in Alcohol 1 in 25, in Olive Oil 1 in 8, in Chloroform 1 in 1½, insoluble in water. May be given in Malt Extract.

Uses.—As an intestinal disinfectant for the diarrhœa of consumption, and of typhoid and for dysentery. 8-grain enemata are useful. Is painless in action, and promotes healing of ulcers. Internally with success to lessen fœtor of urine and stools. A vermifuge in tænia and ascarides. Suppository and ointment (10%) are used for pruritus ani. A 10 to 20% solution in oil is successful as a parasiticide in scabies. The vapour is inhaled for whooping cough.

Seven doses (1·75 Gm. in all) of Naphthalene taken as anthelmintic in the case of a child six years old caused death.—P.J. ii./11,407.

Moulded into blocks or sticks, it is sold as ✱Alabastrine (T.M. 82510 Class 2), ✱Camphylene (T.M. 78560 Class 2) and Albo-carbon ('Carbon' in Lamp trade).

Pilula Naphthalini, 3 grains.

A **Precipitated Form** is also made by adding an alcoholic solution to water. For use as a dusting powder diluted 1 in 10.

Mosquitos in wells, etc., can be destroyed by Napthhalene.—B.M.J. ii./14,15

N.C.I.—Naphthalene of commerce with 2% Creosote and 2% Iodoform. Used to dust the clothes in the war as a vermicide.

Must not be used too freely especially at the fork, as it may smart Useful in conjunction wtih Vermijelli.—A. D. Peacock, B.M.J. i./16, 784.

A cheap inert powder might replace the Iodoform, thus Naphthalene 96 Creosote 2, French Chalk 2.—J. P. Kinloch, B.M.J. i./16,790.

Undervests of butter muslin dipped in a solution of 1% each Naphthalene and Sulphur in benzol or petrol effectual in preventing pediculosis.—J. A. Gunn, B.M.J. i./17,579.

Naphthalene Tetrachloride.—*Syn.* NAPHTHALIN HYDROCHLORIDE, $C_{10}H_8Cl_4$ = 269·954. *Dose.*—3 to 12 grains (**0·2 to 0·8 Gm.**), in cachets or pills.

Manufacture.—Mix well powdered Naphthalene 400 and Potassium Chlorate 800 and dust into concentrated commercial Hydrochloric Acid in an *open* vessel (chlorine is given off) with care. Allow to stand for several hours. Drain off the liquor from the yellow mass and wash with water. Warm with alcohol to about 80° C. and filter, repeating the liquor. The residue is again extracted with alcohol until it is white; everything dissolves except the Naphthalene Tetrachloride. Recrystallise from Chloroform.

White crystals, melting at 182° C., insoluble in water.

Has been used in cases of bacterial intoxication such as colitis with improvement. It is doubtful whether the substance acts as an antiseptic after leaving the stomach. It was tried in 8 grain doses in cachets every 4 hours (night as well).—J. Langford Moore, St. Barts. Hosp. Jan. 1910.

P1 NARCOTINA.

Syn. ANARCOTINE. $C_{19}H_{14}(O.CH_3)_3NO_4$ = 413·304.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) or more in a pill.

An alkaloid from opium (sometimes as much as 15% of), in white crystals, insoluble in water, soluble 1 in 3 of chloroform, 1 in 100 of 90% alcohol, 1 in 125 of ether, soluble also in benzol. An antiperiodic of great power,—analogous to, if not identical with, Quinine. Of signal use in malaria. Suggested for use in sleeping sickness. Dose as above.—L. ii./12, 1541. *c.f.* also Morphine Combination.

Synthesis of, —*vide* Perkin and Robinson.—Proc. Chem. Soc. 26 (1910), 46 and 131.

P1 Cotarnine Hydrochloride. *Syn.* **✱Stypticin** (T.M. 216872).

An application for suspension of the trade mark unsuccessful.—B.M.J. i./15,340.

$C_{12}H_{15}NO_4HCl$=255·642.

Dose.—¼ to ½ grain (**0·016 to 0·03 Gm.**) internally or hypodermically, in special cases up to 4 grains in 10% solution.

The salt of the base P1 Cotarnine $C_{12}H_{15}NO_4$=237·19, obtained by oxidising narcotine with manganese dioxide and sulphuric acid, in primrose-coloured granular crystals, very soluble in water and alcohol. It was placed on the market by a British firm long before the Germans boomed it under the fancy name.—F. A. Hocking, C.D. Mar. 10/17. M.pt. 125° C. (Dott). Is allied to Hydrastinine (*q.v.*). In all forms of uterine hæmorrhage, useful in checking profuse menstruation. 1 to 2% may be used on a tampon.

Erysipelas, eczema and shingles may be treated with a 5% ointment.

Ⓟ **Tablets of Cotarnine Hydrochloride**, ¾ grain (**0·05 Gm.**).

Ⓟ Ointment 2% with Unguentum Lanolini, in herpes and ulcerative balanitis. In more acute similar complaints up to 10% strength.

Ⓟ **Stypticin Wool**, 30% and Ⓟ **Gauze** are made.

Ⓟ **Urethral Bougies of Cotarnine** in cacao butter or gelatin contain $\frac{1}{2}$ grain (**0·03 Gm.**), four inches long, and $\frac{1}{6}$ inch in diameter, are used to check bleeding caused by sounds or catheters.

[P1] **Cotarnine Phthalate.** ✱STYPTOL (T.M. 253307).
$(C_{12}H_{15}NO_4)_2.C_6H_4COOH.COOH = 640·469.$

Dose.—$\frac{3}{4}$ grain (**0·05 Gm.**), but much larger doses are given by some practitioners, *e.g.*, 10 grains without unpleasant effects, every 2 to 3 hours. Five grain doses suitable for mild cases.—George Foy.

An orange red body soluble in water. Contains 73% Cotarnine.

Ⓟ **Styptol Tablets** $\frac{3}{4}$ grain (**0·05 Gm.**).

Myristicin, the constituent of nutmeg, dill, and parsley oils, can be used as a starting-point for the synthesis of the base Cotarnine, and thence to produce styptol and stypticin.—Zeit. f. Angew, Chem , 1911,40. *C.f.* Hydrastinine, *Vol. II.*

NEBULÆ.

These are solutions for application to the throat and nose by the aid of a fine spray apparatus or atomiser. By means of a glass, metal or vulcanite tube, a jet of fine spray may be directed into the pharynx or nares, and if a deep breath be taken at the proper moment some of the spray will enter the larynx. The patient must be taught to carry this out personally. Nebulæ are aqueous, or of Liquid Paraffin, Almond Oil or Olive Oil. The following indications may prove useful :—

Antiseptic, Healing and Demulcent.—**Nebula Alkalina,** *q.v.*

Antiseptic and Soothing.—(*a*) **Nebula Acidi Borici**—Glycerin of Boric Acid 1 drachm to the ounce ; (*b*) **Nebula Potasii Permanganatis,** *q.v.* ; (*c*) **Nebula Acidi Tannici**—Glycerin of Tannic Acid 40 minims, Rose Water to 1 ounce.

Analgesic.—[P1] **Nebula Cocainæ Oleosa,** *vel* **Aquosa** *q.v.*

Asthma.—(*a*) **Nebula Anti-asthmatica "Compound Asthma Fluid"** *q.v.* and (*b*) Ⓟ **Nebula Lobeliæ Composita**—Lobelia Tincture, Belladonna Tincture, Stramonium Tincture, of each 10 minims, Ipecacuanha Tincture 5 minims, Pyridine 1 minim, Sodium Nitrite 10 grains, Glycerin and Rose Water to 1 ounce. (The pyridine is rather objectionable in taste.)

Astringent.—(*a*) **Nebula Zinci Chloridi,** 10 to 25 grains, with Rose Water 1 ounce ; (*b*) **Nebula Cupri Sulphatis,** 5 grains to the ounce ; (*c*) **Nebula Ferri Perchloridi,** *q.v.*

Diphtheria.—To dissolve membrane, **Nebula Acidi Lactici,** *q.v.*

Catarrh, Nasal, and congestive state of the Eustachian tubes.—Ⓟ **Nebula Cocainæ Composita**—Cocaine 2 grains, Cinnamon Oil 5 minims, Menthol 15 grains, Liquid Paraffin to 1 ounce. **Nebula Resorcini** 1%. **Nebula Antipyrini** 3%.

Catarrh, Dry.—(*a*) **Nebula Eucalypti**—Eucalyptus Oil 20 minims, Liquid Paraffin to 1 ounce ; and (*b*) **Nebula Eucalypti Composita,** *q.v.*

Hay Fever.—(*a*) **Nebula Suprarenalis Extracti,** 5% and 10% ;

(*b*) **Nebula Quininæ Antiseptica**—Quinine Hydrochloride 30 grains, Carbolic Acid 8 grains, Glycerin and Rose Water to 1 ounce.

Phthisis.—(*a*) **Nebula Creosoti Composita**—Creosote 5 minims, Cassia Oil 5 minims, Almond Oil to 1 ounce; (*b*) **Nebula Iodi Composita**—Iodine 2 grains, Carbolic Acid 8 grains, Menthol 5 grains, Camphor 2 grains, Liquid Paraffin to 1 ounce. 2% Creosote may be added (if made with Almond Oil).

Stimulant.—(*b*) **Nebula Mentholis**, *q.v.*; (*b*) **Nebula Mentholis Composita**—Menthol and Camphor, 20 grains each, Cinnamon Oil 5 minims, Liquid Paraffin to 1 ounce; (*c*) **Nebula Potassii Chloratis cum Ferro, L.H.**—Potassium Chlorate 15 grains, Solution of Ferric Chloride 20 minims, Glycerin 1 drachm, Water to 1 ounce.

For a common cold where *B. Septus* is the principal cause of infection, as spray and gargle Potassium Chlorate 10 grains, Solution of Ferric Chloride 15 minims, Glycerin 30 minims, and Water to 1 ounce, are useful. This is said to be of little value after 24 hours, when give a Potassium Chlorate gargle.—L. ii./08,1661.

Tonic.—(*a*) **Nebula Pini Composita**, containing Pine Oil, Eucalyptus Oil, Cassia Oil, of each 5 minims, Menthol 5 grains in Almond Oil 1 ounce; also (*b*) $\boxed{\text{P}1}$ the same, with Cocaine 1%.

For further formulæ, consult Index.

NITROGLYCERINUM, P. Jap.

$C_3H_5(O.NO_2)_3 = 227{\cdot}085.$

Syn. TRINITROGLYCERIN; GLONOIN; TRINITRIN; GLYCERYL TRINITRAS.

Dose.—$\frac{1}{200}$ to $\frac{1}{50}$ grain (**0·0003 to 0·0013 Gm.**) increased to $\frac{1}{10}$ grain.

Manufactured by adding Glycerin to Nitric and Sulphuric Acid mixed. A mixture of 3 parts by weight Nitric Acid Sp. Gr. 1·3 and 5 parts by weight of Sulphuric Acid Sp. Gr. 1·842 is used, and to nitrate 1 part by weight glycerin is added to 8 parts by weight of the mixture. By using Nordhausen Acid a yield of 230 per cent. of Nitroglycerin is obtainable.—Chem. News, Feb. 14, '08,74. See also P.J. i./09,160.

Alternatively the nitration is conducted with a mixture of Nitric Acid and 'Oleum' (*q.v.*)—this is almost anhydrous, but contains no free Sulphuric Anhydride. The use of Oleum is not essential but a matter of convenience. The following are in use:—

HNO_3	40	46·5	41·5
H_2SO_4	58·4	52·5	58·0
H_2O	1·6	1·4	0·5

About 6 parts of mixed acid are used to 1 part of Glycerin. In this country the nitration must be conducted at not exceeding 22°C.

The nitrators used are the older type of Nobel and more particularly the Nitrator Separator of Thomson, Nathan & Rintoul.—See J.C.S.I., 1908, p. 193. In this latter invention there are no cocks, hence reduction of danger and the Nitro-glycerin is removed from the acid mixture as soon as separated.—Explosives: E. de Barry Barnett, 1919.

A useful account of manufacture of Nitroglycerin. The finished and washed Nitroglycerin is mixed with Siliceous Earth, *e.g.* Kieselguhr. This earth is used for its absorbent power in making Dynamite.—Alfred Nobel's discovery in 1866. Guncotton is made by mixing with cotton waste from the Lancashire spinning sheds. Other mixtures are known as **Gelignite** (containing 56·5%), **Samsonite, Saxonite** and **Carbonite** (25% with Potassium Nitrate 30, Barium Nitrate 4, Wood Meal 40, and Sodium Carbonate 1%).—R. R. Pirrie: Pr., Feb., 1912,259

Cordite—Stated to have composition Nitroglycerin 30, Nitrocellulose 65, Soft Paraffin 5. Method of making.—Na July 28, 1910, p. 109. Eaten by soldiers, produces headache.

Nitroglycerin is a dense, opaque, white, oily liquid, transparent when dehydrated, and of Sp. Gr. 1·600. It has no odour, is slightly volatile, and has a sweet, aromatic, and pungent taste. It is slightly soluble in water, P. Jap. says 1 in 800, freely soluble in ether, 1 in 6 of almond oil, freely soluble in absolute alcohol, and 1 in 15 of 90% alcohol. Nitroglycerin in fatty or oily solution is perfectly safe and stable, but in Alcoholic Solution the substance must be handled with the utmost caution.—*Vide infra.*

Uses.—Especially valuable in angina pectoris and generally to relieve dyspnœa of cardiac, pulmonary, or renal origin.

Nitroglycerin, in two minutes after taking a dose accelerates the pulse, relaxes the arteries, produces a feeling of fulness all over the body, but particularly in the head by a throbbing at the sides of the temples. It also causes headache, which lasts from 15 minutes to several hours, according to the quantity taken ; but to patients accustomed to its use the headache is not felt. In treating angina pectoris, neuralgia, asthma, headache, sea-sickness, and Bright's disease, its action is like that of amyl nitrite and the other nitrites, but its effects last much longer. For the weak heart of fatty degeneration and of old persons, this lessened tension proves valuable.

Physiologically it belongs to the class of nitrites—probably, therefore, sodium nitrite is formed directly it gets into the blood.

Notwithstanding the effect on the vascular system by 1/1600 grain of Nitroglycerin (D. J. Leech) or a fraction of a minim of Amyl Nitrite, even large quantities of the medical preparations do not readily cause death.—R. R. Pirrie, Pr. Feb. 1912,259.

It is absorbed into the blood practically unchanged, hence its powerful and prolonged action (Brunton)—ex Pharmacol.

Physiological action of Nitroglycerin and the Nitrites. Formation of Sodium Nitrite in the blood (Matthew Hay) Gamgee's work on Methæmoglobin production. Observations of Haldane, Maghill and Mavrogordato on conversion of hæmoglobin into a mixture of Methæmoglobin and Nitric-Oxide-Hæmoglobin under the influence of Nitrites. Murrell's work on the effects of Nitroglycerin on the lower animals.—R. R. Pirrie, Pr. Feb. 1912,259.

Pharmacological action of Nitric Esters. These bodies act mainly on unstriped muscle fibre and especially on that of the arterioles. The esters of the Monohydric Alcohols (Methyl, Ethyl, etc.) are relatively weak. Methyl Nitrate, for example, injected intravenously is more than ten times weaker than Nitroglycerin, and when given by the stomach more than 100 times weaker. The presence of OH groups (in the higher series) diminishes action as compared with the fully nitrated esters.—C. R. Marshall, B.M.J. ii./12,644.

Strychnine, Ergot and Belladonna are recommended to counteract the headache produced by large doses.

For further notes on treatment see References p. 560

Injectio Nitroglycerini Hypodermica.

Dose.—1 to 4 minims (0·06 to 0·25 Cc.).

Nitroglycerin Solution 5, Alcohol (90%) 2, Distilled Water to 12.

Contains about $\frac{1}{240}$ grain in 1 minim. Acts promptly; useful in collapse, &c., when the patient cannot swallow.

Tablets, Hypodermic, $\frac{1}{250}$ and $\frac{1}{100}$ grain.

Liquor Nitroglycerini, 1%. *Made official as*

Liquor Trinitrini (*Off.* and B.P. 1898). **F.E., P.Jap., P. Hung.**

Dose.—$\frac{1}{2}$ to 2 minims (0·03 to 0·12 Cc.) gradually increased to 10 minims, if necessary, every 3 or 4 hours, in any aqueous vehicle.

Trinitroglycerin 1 part by weight, Alcohol (90%) *q.s.* to 100.

Dissolve. Sp. Gr. 0·840. 110 minims contain 1 grain. A colourless neutral liquid; 10 Cc. with an equal volume of water keeps clear, but the further admixture of 1 Cc. of water causes opacity (presence of full proportion of Glyceryl trinitrate). Diluted further, the latter separates in oily drops, which explode when struck with a hammer. Should be kept from sunlight. A 5% and a 10% solution in absolute alcohol are also prepared commercially but are not safe for use in dispensing. (**Spiritus Glycerylis Nitratis, U.S.,** has 1% by weight.) **U.S.** cautions that violent headache may be caused when freely applied to the skin. A little caustic potash solution should be poured over it to decompose should it be accidentally spilled.

For the Assay of Nitroglycerin in Solutions, etc., see Vol. II.

Incompatibility.—Nitroglycerin is decomposed by caustic alkalis. The alcoholic solution is also precipitated by water in excess.

Haustus Nitroglycerini (No. 1.) Vic. Park. *Dose.*—$\frac{1}{2}$ to 1 ounce.

Solution of Trinitrin 1 minim, Compound Chloroform Tincture 10 minims, Pimento Water to $\frac{1}{2}$ ounce.

In asthma $\frac{1}{2}$ to 1 minim doses with Spiritus Ætheris Nitrosi 20 minims every hour for 3 doses useful.—Haviland Hall, Tilley.

Haustus Nitroglycerini (No. 2).

Nitroglycerin Solution 1 minim, Sodium Bicarbonate 10 grains, Compound Tincture of Cardamoms 1 drachm, Spirit of Chloroform 20 minims, Water to $1\frac{1}{2}$ ounces. To be slowly sipped at first symptoms of an attack as restorative in angina pectoris.—Pr. Dec. '10, 863—modified.

Oleum Nitroglycerini, 1% in almond oil.

Dose.—1 to 2 drops or more on sugar. Recommended as being more stable than the alcoholic solution.

Capsules (gelatin) of Nitroglycerin.

Dose.—1 or 2. Contain $\frac{1}{100}$ grain, or more or less as prescribed.

Tabellæ Nitroglycerini, B.P. 1885. *Dose.*—1 or 2.

Introduced by the late William Martindale in 1878, $\frac{1}{100}$ grain in each. These tablets have the nitroglycerin in solution in chocolate, $2\frac{1}{2}$ grains, in a perfectly safe and inexplosive, stable and non-volatile, portable and palatable form. The small bulk, precise dose, and quick action, if well masticated and swallowed, render this mode preferable for administering nitroglycerin.

Additional Strengths of Tabellæ.

The tablets are also prepared containing $\frac{1}{75}$, $\frac{1}{50}$, and $\frac{1}{25}$ grain, and 1 milligramme respectively, for those accustomed to their use, as well as $\frac{1}{200}$, $\frac{1}{400}$, and $\frac{1}{500}$ grain in each, for administration to ladies, delicate persons and children, for whom this is a sufficient dose to ward off sea-sickness. The tablets appear to be non-poisonous even to children; a surgeon records that on one occasion two children, one three and the other six years of age, ate between them straight away two dozen, $\frac{1}{100}$ grain in each, without any injurious effects.

An employé in the author's laboratory (1905) ate a piece of the nitroglycerin mass weighing about 2 ounces, mistaking it for ordinary chocolate. A bad headache supervened, necessitating his lying down, but he was at work again the following day.

Single doses of 5 grains and *daily dose* of 20 minims of Pure Nitroglycerin tolerated.—B.M.J.E. ii./05,52.

Uses of Nitroglycerin Tablets.—One tablet every three or four hours to relieve or ward off attacks of angina pectoris, astama, sea-sickness, neuralgia, headache, epilepsy, and may be tried for Bright's disease and dysmenorrhœa. In tinnitus aurium has been found useful. A dose of any preparation of nitroglycerin acts more promptly if taken on an empty stomach. (*See also* references in literature *postea.*)

In sea-sickness there is a cramp of the vessels and anæmia of the central nervous system. The tablets are of benefit—symptoms quickly alleviated. Repeated doses can be given with perfect safety. —B.M.J.E. i./13,91. *See also* B.M.J. ii./93,596.

In asthma, of immense value during a paroxysm, but it must not be forgotten the spasm may be of a compensatory nature and of value to the patient.—B.M.J. ii./11,793.

In arterio-sclerosis patients made much more comfortable by small doses for a week or two.—B.M.J. i./07,63.

Should be carried about in the pocket to be taken immediately any pain comes on in the chest. These not only relieve pain but lessen the dangerous condition of which the pain is a symptom.—B.M.J.ii./09,66.

Tabellæ Trinitrini, Trinitrin Tablets (*Off.*).

Tablets of chocolate, each weighing 5 grains (0·3 Gm.), and containing $\frac{1}{130}$ grain (0·0005 Gm.). B.P. '98, contained $\frac{1}{100}$ grain. These tablets are double the weight of those in B.P. 1885, and as first manufactured by W. M. This dilution would appear to be unnecessary. *Dose.*—1 or 2, *vide* Tabellæ Nitroglycerini, *ante.*

The ordinary lozenges of commerce are unreliable, as they do not contain the proper amount of the drug.—M.A. 1906,37; but the tabellæ with chocolate and fat basis are accurate and lasting.

The Tablet Triturates of American manufacture reputed to contain $\frac{1}{100}$ grain Nitroglycerin contained $\frac{1}{1000}$ grain only. 'Need of honest drugs.'—B.M.J. i./07,1498.

Tabellæ Nitroglycerini et Caffeinæ.

Dose.—1 every 4 hours or as required—each containing $\frac{1}{100}$ grain Nitroglycerin and 1 grain Caffeine; for use in migraine.

[P1] **Tablettæ Nitroglycerini et Sodii Iodidi cum Arsenio.** *Dose.*—1 in every four hours. Each equivalent to Nitroglycerin $\frac{1}{50}$ grain, Sodium Iodide 15 grains, with Fowler's Arsenical Solution 2 minims. This dosage may be considered a routine treatment of aortic disease. The quantity of Nitroglycerin employed is frequently too low, but the above may be given with perfect safety.—B.M.J. i./07,611.

[P1] **Tabellæ Nitroglycerini** $\frac{1}{150}$ grain (0·0004 Gm.) **et Strychninæ** $\frac{1}{25}$ grain (0·0025 Gm.).

Also {Nitroglycerin $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{100}$ grain with
Strychnine $\frac{1}{20}$, $\frac{1}{50}$, $\frac{1}{100}$ grain

In migraine Nitroglycerin, especially if in combination with Strychnine, is of value.—Gowers.—B.M.J. i./09,1400. It relieves headache almost immediately. Its vasodilator effect lowers blood pressure in the peripheral vessels, and so reduces cerebral and arterial pressure.

In high arterial tension where the heart is beginning to fail and such symptoms as irregularity of pulse, giddiness, shortness of breath, or even œdema of ankles begin to appear, combine cardiac tonics—Strophanthus, Digitalis or Strychnine—with Vasodilators. Rest is of utmost importance.—Brunton, L. ii./08,1133.

Tabellæ Nitroglycerini Compositæ, W.H.

Contain Nitroglycerin $\frac{1}{100}$ grain, Amyl Nitrite $\frac{1}{4}$ grain, Menthol $\frac{1}{50}$ grain, Capsicum $\frac{1}{100}$ grain.

Ⓟ **Tabellæ Anti-Asthmaticæ.** (H.).

Dose.—1 to 4 thrice daily.

Nitroglycerin $\frac{1}{200}$ grain, Sodium Iodide 2 grains, Potassium Bromide 2 grains, Fluidextract of Euphorbia Pilulifera 3 minims, Tincture of Lobelia 4 minims.

Very useful in asthma; the nitroglycerin depresses the peripheral ends of the vagus nerves and stimulates the heart by removing the inhibitory action of the vagus and relieving blood vessels elsewhere.

Tabellæ Digitalini et Nitroglycerini *aa.* $\frac{1}{100}$ gr. are also prepared *v.* Digitalin.

Tabellæ Nitroglycerini 1/100 and 1/200 grain **et Thyroidei Sicci** (Standardised—*Martindale*), $\frac{1}{2}$, $1\frac{1}{2}$ and 3 grains, in chocolate basis, are prepared for employing the combined action of these two remedies.

References to use of Nitroglycerin.

Blood Pressure in Man :—

Maximum pressure at various ages in men, women and children. From 8 to 14 it is about 90 mm., from 15 to 21 it is 100 to 115 or 120. from 21 to 65 from 120 or 125 up to 135 or 150, above 65 it may still be 135 to 150 or up to 200 or higher. In women it is about 10 to 15 mm. lower than in men. In athletic men it may be about 10 to 15 mm. higher than in moderate development. The cases in which low tension, below 100 in men and 80 or 90 in women generally are (1) weakness after some illness, especially influenza, (2) in commencing phthisis, (3) in heavy smokers.

In *lowered pressure* abundant food (animal), meat extracts, tonics as Iron, Arsenic, Malt, Cod Liver Oil, Hypophosphites, Glycerophosphates, and as cardiac tonics, Strychnine, Strophanthus, Digitalis and Caffeine are advised.

In Raised Tension.—High tension, especially in advancing age, though giving rise to sense of power and desire for action both physical and mental, may be a danger signal. It is not only a direct cause of cardiac failure or ruptured vessels, but produces atheroma of the arteries, and thus weakening them renders them liable to break. By detecting the rise in time in middle life, tension may be kept down, changes in the arteries leading to arteriosclerosis and atheroma may be prevented, and life prolonged.

Nicotine is almost the only drug which nearly equals Adrenalin in power of raising blood pressure. Tobacco, tea, and coffee must be prohibited.

Mercurials are beneficial, ½ grain or 1 grain of Calomel, or 3 to 5 grains of blue pill once or twice a week, followed by Saline, Potassium Iodide, in dose of 1 to 10 grains thrice daily useful. The Hippurates, Sodium Benzoate, Sodium Nitrite ½ grain, gradually increased to 4 or 5 grains, as also **Pulvis Sodii Nitritis Compositus**, *q.v.*, all tend to keep pressure down. **Nitroglycerin** and **Erythrol Nitrate** act similarly. A doctor was able to keep himself free from attacks of angina by daily use of Erythrol Nitrate for 3 or 4 years, beginning with ½ grain thrice daily, and gradually increasing it. When the pain is acute, **Amyl Nitrite** is the quickest means of relieving, or a little Chloroform as inhalation.—Sir L. Brunton, L.ii./08,1126 ; B.M.J.ii./09,64.

The influence of tobacco smoking as cause of arteriosclerosis is not settled. Clinical writers are disposed to admit Tobacco as at least a predisposing cause, though many deny it.—F.W. Andrewes, Report to L.G.B., per P.J. ii./12,739.

The blood pressure has been found to rise for a few seconds 5 to 7 mm. or more after Nitroglycerin $\frac{1}{400}$ grain, before falling in the case of aged persons. It was thought that cardiac stimulation occurred before vascular dilatation in old vessels.—B.M.J. ii./09,1314.

Myxœdema has been treated with $\frac{1}{50}$ grain doses with purgings. In puerperal eclampsia it is strongly recommended. Lowers blood pressure, and increases amount of urine. In epileptic vertigo, small doses relieve.

Angina pectoris gravior, treated with nitroglycerin tablets and amyl nitrite, prompt relief.—B.M.J. i./06,304 ; B.M.J. i./09,994.

Gastric origin of angina. In certain favouring circumstances, tension of the gastric atmosphere is associated with painful attacks indistinguishable from those of angina pectoris. A case of flatulent dyspepsia developed seizures of a painful kind—in the upper intercostal nerves including the costo-humeral branch. Nitroglycerin effective—seizures always subsiding immediately.—B.M.J. i./11,613.

To reduce the vascular-tension in cirrhosis of the kidney.—Tirard, Med. Treatment.

In arterio-capillary fibrosis nitroglycerin $\frac{1}{400}$ grain every hour whilst awake, for a few weeks at a time.—Whitla, Pract. Med. '08.

In collapse from chloroform, or typhoid and other fevers, shocks from accidents, and nausea and faintness from surgical shock, or when brandy is indicated.—L. ii./85,257.

In "cardiac asthma" great relief. In cases of marked arteriosclerosis combine with Strophanthus or Digitalis.—B.M.J.ii./11,1326.

Morphine craving relieved.—L.i./09,1334.

In locomotor ataxia may be given for long period, in increasing doses, relieving the crisis and lessening the pain.—B.M.J. ii./07,1823.

Gallstone colic quickly relieved by tablets.—L. i./96,353.

Paroxysmal tachycardia: it is *the* treatment.—B.M.J. ii./04,109.

Gangrene of the hand, severe case, successfully treated. Of great value in all cases of impaired circulation.—B.M.J. i./05,16.

Stokes-Adams disease with arteriosclerosis—M.P.C., Jan. 23, 07.

In mental disease. In certain cases depending on cerebral anæmia from vaso-constriction produced rapid cure.—M.A., 1908,37.

In hæmoptysis more lasting in effect than amyl nitrite.—L.i./08,565.

Subacute neuritis, a case of, with general dropsy. Nitroglycerin in small doses increased the quantity of urine, and the dropsy disappeared completely in ten days.—B.M.J. ii./08,1670.

In Carbon Monoxide poisoning $\frac{1}{100}$ grain injected, together with inhalation of Oxygen advised.—Pr. Dec. '08,842.

In acute lobar pneumonia found to aid the action of Digitalis in cases with cardiac weakness—10 minims of Tincture of Digitalis with $\frac{1}{2}$ minim of solution of Nitro-glycerin every three or four hours. Especially indicated when the renal secretion is scanty, and the urine contains more than the usual trace of albumin.—Yeo.

In chorea, Nitroglycerin may be given in full doses, and, if necessary, Morphine.—N.Y.Med.Times, Aug. 1911, per Pres. Nov. 1911, p. 284.

A female *æt.* 47, melancholic in nature, for two years had an attack of hemiplegia, evidently hæmorrhagic, blood pressure rose to 170—180 mm. This was successfully reduced to 110—120 mm. by purging daily, and by Nitroglycerin and suitable feeding. Mental symptoms disappeared.—B.M.J. ii./11,1472.

Sleeplessness, where psychic or somatic excitement is the cause, endeavour to reduce the reflex excitability of the cord or lower arterial tension by Nitroglycerin or Bromides.—B.M.J. ii./13,1209.

Trench foot. Small doses with a little strychnine useful—dilates peripheral vessels. *See* Trench Foot, Therapeutic Index.

Wounds caused by N.G. explosion; of peculiar churned-up and softened nature probably caused by the escape of internal body pressure into the vacuum caused by the explosion.—J. L. Thomas, B.M.J. i./16,89.

Methyl Nitrate which is soluble in water to extent of 1 in 30 at 20°C., is 100 times less powerful than Nitroglycerin when given *per os*, and when given into the blood stream is about 15 times less.—P.J. i./13,624.

NUTRIMENTA.

For a **classification** *of Foods, a consideration of* **"Amido Acids,"** *the* **Biuret Reaction** *for Albuminoids,* **Yeast Extracts as** *Foods,* **Milk Preservation, Bread** *and* **Flour Standardisation,** *the* **Bleaching of Flour,** *and* **Injurious Admixtures to Flour.**——*See Vol. II.*

The amount of protein or albuminoid food needed daily for the actual physiological want of the body is not more than half that ordinarily consumed by the average man. A diet of low protein value is strongly recommended for the average healthy man and for those suffering from arteriosclerosis.—B.M.J. i./06,123.

Numerous treatises against excessive meat diet have appeared. Man was not intended to be the carnivorous animal he has become.

The Protein requirement or "Do we eat too much meat?"—W. Tibbles, B.M.J. ii./11,1349.

Waste and Overeating. A good résumé and an excellent tirade against white bread faked and bleached on which pigeons mope and die in three weeks.—B.M.J. i./15,214.

Some strange foods—Agar, Seaweeds, &c.—L. i./05,1524.

Metabolism experiments and treatment of diseases.—L.i /06,1154.

Metchnikoff suggested removal of the large bowel as owing to its content of 28 billion bacteria produced daily he thinks it is a source of mischief.—B.M.J. i./07,194. *See* also a note under Tuberculosis (Vaccine Chapter).

Experiments on rats showed that a meat diet is prejudicial to powers of reproduction and lactation, suggesting that the increased consumption of animal food in this country may tend to the decrease in birth-rate, and diminished powers of lactation.—B.M.J. i./07.193.

DIETETICS, SYSTEM OF, edited by G. A. Sutherland may be consulted for special diets in various conditions. In tuberculosis very high feeding often results in arrest of the disease; in diet of gout and rheumatism Luff repudiates the idea that meat is a poison, and will have nothing to do with purin-free diet. In urinary and renal diseases lime and foods containing lime to be excluded. Preference for Magnesia bases to be given in treatment of oxaluria. Sir P. Manson deals with diet in diseases of hot climates.

Preparations of Meat and Blood.

Meat Extract is the product by extracting fresh meat with boiling water and evaporation. Contains not less than 75% of total solids. (Meat extract should be practically free from Albumin).—Committee on Food Standards of the Association of Official Agricultural Chemists, Oct. 1907.

The yield from meat is about 3%.

Fluid Meat Extract is identical with above prepared by Liebig's original process, except that it is evaporated at lower temperature and contains not more than 75 and not less than 50% of total solids.

Meat Juice is the fluid portion of muscle fibre obtained by pressure or otherwise and may be concentrated at a temperature below the coagulation point of the soluble proteins. The solids contain not more than 15% Ash, not more than 2·5% NaCl (calculated from total Cl), not less than 12% N., not more than 4 or less than 2% P_2O_5. The nitrogenous substances contain not less than 35% coagulable proteins and not more than 40% meat bases.—Allen, 1914, Vol. VIII., p. 389.

Analysis of Meat Extract and similar preparations.—L.ii./08,1541,

"Some Meat Extracts are fortified by additions of meat fibre, blood, albumin, and other nutritious constituents, but they cannot even now be ranked as true foods, for no one could eat sufficient of them, owing to the small quantity of Proteins present and the large amounts of extractive and mineral matters. The amounts of such meat fibre and albumin that it is possible to add to Meat Extract are relatively small and can make little difference to the food value of the preparation. The white of one egg contains as much nutritive matter as three tablespoonsful of any of these meat preparations (R. Hutchinson) and costs only $\frac{1}{5}$ of the latter."—A. R. Tankard, P.J. ii./11,72. This monetary comparison is not now in order.

Nutritive effects of Beef Extract. It was found both on man and dog that the addition of beef extracts (commercial and home-made) to the diet led to an increase of body weight. Accompanying this was a retention of a considerable portion of the nitrogen given in the extracts. The extracts caused a reduction in the output of Nitrogen by the fæces,—this no doubt being due to the better digestion and absorption of food of the ordinary diet,—hence the extracts may be accredited with both a direct and indirect nutritive value.—W. H. Thompson, W. Caldwell and T. A. Wallace. The question was raised as to whether the effects were not due to stimulation of gastric secretion.—B.M.J. ii./11,613, *et seq.*

'A meat extract is a preparation (involving the use of heat, usually 70° C. by repeated extraction) of the soluble matters of lean beef: it consists chiefly of the nitrogenous extractives of flesh—creatine, creatinine and other meat basis, the non nitrogenous extractive matters, mineral matters varying quantities (usually small) of true Protein substances (Albumin, Albumoses and Peptone), Gelatin and Water. Creatine and its allies are products of metabolism of protein and possess no food value. Gelatin has no nutritive value and the nutritious constituents of meat extract are therefore confined to the proteins, *i.e.*, the albumins and their immediate products of digestion. By far the larger number of true meat extracts contain at most only traces of proteins."—Tankard, P.J. ii./10,407; ii./11,72. See also P.J. ii./10,430.

Meat Extracts and their substitutes at the best are only stimulants.—P.J ii./08,615. They often contain too much vegetable extractive.—P.J. i./07,584.

Concentrated Beef-Tea.

A firm jelly, in tins and skins, contains the natural gelatin of the meat, and, diluted, forms a nutritious substitute for true beef-tea.

Meat Juice (Brand's).

A teaspoonful in a wine-glassful of water is a useful pick-me-up. Is prepared by cold process resulting in retention of full activity of juice of the raw beef.

✱**Ferrocarnis** (T.M. 346870).

Dose.—One teaspoonful in water thrice daily with meals.

Described as a flavoured solution of iron in organic combination with concentrated raw meat juice. An Iron Tonic food.

Essence of Beef.

A soft, transparent, amber-coloured jelly, prepared from beef by exhausting with tepid water. It is agreeable to the palate and stomach of a delicate invalid; is useful in allaying obstinate vomiting. It is best taken cold by teaspoonsful. Similar essences are made from **mutton** and **chicken.**

Meat jelly is suitable for ulcerated stomach. Gelatin is a powerful protein sparer, easily digested, and fixes a great deal of acid.—Pr., Nov./08,679.

Beef, Chicken, Mutton and Veal Peptones, are also prepared.

Restorative Essence of Beef is made from fresh beef, freed from fat, finely chopped up—1 pound mixed with distilled water 8 ounces; add 5 drops of hydrochloric acid, and 60 grains or less of salt; stir well and allow to macerate for 3 hours; strain. The product has an agreeable taste, and should be taken cold. *Dose.*—A wineglassful or more (Ringer). It is also prepared *Peptonised* by digestion with pepsin at the body temperature.

These are best freshly prepared for the patient, but may be preserved a reasonable time by addition of formalin or chloroform.

'ZOMOTHERAPY'—feeding with fresh meat juice has been found

of advantage in tuberculosis. *Daily dose.*—The juice from 300–500 Gm. (10 to 16 ounces approx.) of fresh beef is suitable.

The treatment is empirical, but the presence of enzymes, ferments, and diastases, which play an important part in nutrition and in the struggle against infections, may account for the activity of muscle plasma. The results are as constant as they are remarkable. The raw pulped beef *ad lib*, also the juice, should be consumed two or three hours after the animal has been killed. As the solid components of flesh have little therapeutic action, the expressed raw meat juice, *i.e.*, muscle serum, will do equally well.—L. i./11, 22, see also B.M.J.E. ii./01,24.

Beef and Malt Wine.—Extract of Beef 4 ounces, Extract of Malt 8 ounces, Port Wine 1 gallon (Ph. Form.); or a Meat Juice and Liquid Malt Extract may be used instead of the solid extracts.

For **Bovril Wine, Lemco Wine,** also **Coleman's Wincarnis** *see* Proprietary Medicine Chapter. *Vol. II.*

Peptonised Beef Jelly and **Suppositories** are made—*q.v.*

Meat Juices, Liquor Carnis and others.

Dark, reddish-brown liquids consisting of the expressed juice of meat concentrated at a low temperature *in vacuo.* A teaspoonful is added to 3 tablespoonsful of cold or tepid water, and taken in tablespoonful doses or more for sickness or exhaustion. Hot water coagulates the albumen.

✱**Valentine's Meat Juice** (T.M. 289070, 344462, 344464).

Dose.—½ to 2 drachms, diluted.

Two ounces are said to equal 4 pounds of beef; keeps good in warm climates.

✱**Wyeth's Meat Juice** (T.M. 178094).

Dose.—½ to 1 drachm. It contains the albumins of meat in an active and soluble form and the hæmoglobin is unaltered (bright red colour). Should be mixed only with iced, cold, or luke-warm fluids.

✱**Kreochyle** (T.M. 278509, Class 42).—A concentrated meat juice. The *Lancet* has reported that it contains much Albumen. Stated to be easily digestible and stimulating for invalid children and elderly patients, and to prevent vomiting.

Capsulæ Cruoris. BLOOD CAPSULES.

These contain 20 grains of the red corpuscular matter of fresh sheep's blood. To be prepared for the patient twice weekly, and are of great value in anæmia, debility and marasmus.

They are better than dried blood preparations, as the blood is in an easily assimilable condition, and being coated with soluble white gelatin coating the capsules are not unsightly to the patient as are some of the liquid compounds.

Chondrin—the name is given to the mixture of gelatin and mucoid obtained by boiling cartilage.—Halliburton's Handbook of Physiology, 1909, p. 427. Sir E. Sharpey Schafer (Text of Physiology, 1898, vol. 1, p. 114), gives the following:—

Matrix of Hyaline Cartilage:—The organic basis of the matrix was formerly described as *chondrigen.* Chondrin is obtained by boiling chondrigen. Chondrin gelatinises on cooling a solution of it made with warm water, but in many respects differs from gelatin.

Dose.—Ad lib.

It is freshly prepared as a transparent jelly—may be sterilised and supplied to patients in sealed containers. Suggested for use in gouty affections of the joints, also for rickets and weakness.

✱ **Kolentos** (T.M. 338908)—*Dose.*—One teaspoonful *t.d.* in half a cup of warm water or other fluid. For children with difficult digestion one teaspoonful divided into 3 or 4 doses in 24 hours. Described as a combination of extract of muscle cartilage with lactalbumen and the salts of milk. It contains no Casein. A cream coloured powder resembling in appearance powdered egg albumen. As a weight increaser and bowel regulator. For insomnia to be taken at bedtime. It is recommended as a natural food tonic, being easily digested by the weakest organs. Of service in colitis and other inflammations of the intestinal tract.

Hæmoglobin. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

$C_{600} H_{960} N_{154} Fe S_3 O_{179}$ (?) = 13343·24.

The principal constituent of red blood corpuscles. Is supplied commercially in reddish black powder or of extract consistence or in scale form. May be given according to condition in cachet, capsule, or mixed with wine.

Halliburton states that hæmoglobin is useful in ordinary secondary anæmia. Hæmoglobin solution gives a characteristic absorption spectrum and contains in organic combination iron equal to about ½%. *C.f. Vol. II.* for estimation in the blood and further details. It combines readily with oxygen, forming **Oxyhæmoglobin**, which is the substance known in trade as hæmoglobin.

In the arterial circulation, hæmoglobin is present as oxy-hæmoglobin (brilliant red in colour) the oxygen of which is given up to the tissues in its course, returning de-oxidised (dark-red) to the lungs by the venous system where it is ready to take up fresh oxygen and so continue the process.

Hæmoglobin Capsules. Contain 5 grains (**0·3 Gm.**).

Elixir Hæmoglobin. *Dose.*—1 drachm (**4 Cc.**) or more.

Hæmoglobin 10, Water 15, Aromatic Syrup (carefully neutralised), *q.s.* to 100 (approximately 5 grains in 1 drachm). An agreeably flavoured preparation of hæmoglobin as hæmatinic.

Elixir Hæmoglobin cum Lecithin.—*Dose.*—1 to 2 drachms.

As above with 3 grains of Lecithin per drachm added.

Nutrient Powder (Brand's).

On bread and butter or mixed with other food is very palatable—it retains the nutritive value of fresh meat.

✱ **Herogen** (T.M. 372251).—*Directions.*—Two teaspoonsful in a breakfast cup of warm milk and water. For children half the amount of Herogen.

Contains the essentials of lean meat, milk, cereals, malted grain, and eggs, combined in suitable proportions and sterilised to form a complete and well-balanced food. A nutrient to the nerves and tissues, and as a general restorative.

✱ **Somatose.** A yellow granular powder, prepared from meat, principally albumose (semi-digested protein).

Somatose (T.M. 215685 and 322563, Class 3, and 222797, Class 42; 1898 and 1899). Patent 1897 and 3391/1898; both ***expired.*** Examples are given of heating meat fibre with Oxalic Acid and Tartaric Acid, also Calcium Bisulphite.—Per C.D.

Albumin Ovi Siccum, **Ph. Ned., P. Jap.**

Dose.—*Ad lib.* The molecular weight of albumin has been given as approaching 14,000. Yellowish, transparent, horn-like pieces obtained by evaporating white of egg at not exceeding 50° C. (the fresh white of egg is used as antidote in case of poisoning by mercurial and copper salts). Should be easily soluble in about 10 parts of water, producing a neutral solution. Insoluble in alcohol and ether.

Incompatible with mineral acids, alcohol, mercuric chloride, tannin-containing preparations.

Constitution of the albuminous molecule.—Fischer, B.M.J.i./06,221.

In hyperchlorhydria in nervous disorders egg albumen is a food which binds and neutralises Hydrochloric Acid.—Pr. Nov./08, 680.

Albumin Water, for infantile diarrhœa, white of one egg mixed with Sterile Water 8 ounces, Sodium Chloride 5 grains or *q.s.* and a little whisky or brandy added. In the treatment of appendicitis.—B.M.J. ii./07,68.

Albumin Sanguinis.

Dose.—Ad lib. Made by inspissating blood serum. Brown horn-like scales, not so soluble in water as Egg Albumin.

Milk Preparations.

For Milk Analysis vide Vol. II.

Infant Feeding.

Importance of Breast Feeding.—*Biological Properties of Milk. This is urged by E. Janet Lane-Claypon's L. G. B. Report*—(*Abst., B.M.J. i.*/13, 1067). '*All concerned in the health of infants should aim at obtaining satisfactory breast feeding for all infants during, at any rate, the early weeks of life.*

The Enzymes in fresh human milk are Catalase, Amylase and Peroxidase while cow's milk contains, in addition, Perhydridase.—B.M.J. i./13,1068. *We summarise the action of these and other Enzymes in a Table*, see *Vol. II.*

'Upper Milk Feeding' for infants and invalids commends itself for certain reasons. 'Upper Milk' consists of the upper portion of milk that has stood in a cool place until a cream layer has formed. An aluminium dipper (holding 1 ounce) is used for the purpose. By diluting with water, or with water and whole milk, mixtures are obtained containing a high percentage of fat with a normal percentage of proteid. Upper milks are much superior to cream mixtures for feeding—the fat percentages are more uniform and the dilutions do not so readily separate as those employing cream.—Am. Jl. Ph. Feb./08,55.

Dried Milk.

Manufacture.—By spraying milk in a current of hot air or by heating over revolving cylinders. According to Prof. Delépine, although there is great reduction in the number of bacteria, recontamination by pathogenic bacteria occurs in the handling. Precautions should be taken to prevent this. Hygienically and dietetically dried milk should be good. It is superior to condensed milk in protein and fatty matter.—S. Delépine, L.G.B. Report.—P.J. i./15,268.

Analysis of one brand showed proteins 28·71%, fat 29·29%, Milk Sugar 35·2%, Mineral Matter 5·2%, Moisture 1·6%.—L. ii./18,210.

Dried Milk has been much used for **Infant Feeding.** Several Public Corporations are using it in large quantities. The **'Half Cream'** Milk is preferred by some authorities for the purpose as being less rich—indeed a healthy child has been reared on *Dried Separated Milk.* This contains perhaps only 1% fat. Obviously if a child is capable of digesting the *full cream* variety it should have it in preference. *B. Tuberculosis* and all other bacteria are killed in the process of desiccation. For infant feeding and general use are :—

Dried Full-cream Milk (with all its original cream) is reconverted into milk by mixing 2½ ounces (5 heaped tablespoonsful) with 1 pint of hot water. To re-convert

Dried Half-Cream Milk (with half its original cream), employ 2¼ ounces (5 tablespoonsful) to the pint of hot water.

Dried Separated Milk (containing 1% of its original butter fat), employ 2 ounces (4 heaped tablespoonsful) to the pint of hot water.

Feeding Trial with the Dried 'Full' and 'Half' Cream Milk on infants of the poorest class in London.—The milk so made, on dilution with water is sterile, or nearly so. Diarrhœa was practically absent throughout the trials. Roughly 1 of powder to 7 of water is the strength of food to start with.

TABLE OF FEEDS.

	Age of Infant.	Intervals of Day Feeding.	No. of Night Feeds.	Boiling Water.	Dried Milk.
The milk in the bottle to be shaken occasionally whilst feeding, as the fat separates. No food to be kept over.	1 week	2 hourly	2	1 to 1½ ozs.	1 measure (holding about 1 dr. weight)
	2 to 3 weeks	2 ,,	2	2½ ozs.	2 ditto
	4 to 5 weeks	2 ,,	1	3 oz.	2-2½ ,,
	6 to 12 weeks	2½ ,,	1	4 oz.	3-3½ ,,

And so on in about same ratio.

Deserving of trial, especially during summer months when epidemic enteritis is prevalent.—B.M.J. i./09,398.

More easy of digestion,—as seen in the case of infants recovering from acute diarrhœa. These are often unable to take fresh milk even in extreme dilution without recurrence of diarrhœa, yet can digest comparatively concentrated mixtures of dried milk.

The object must be to get the child back again on cows' milk gradually. A teaspoonful to be added to the Dried Milk at first, and gradually increased, but even this was found to be sometimes too much.—Naish, Sheffield Medical Officer, Dec. 1909,427. B.M.J. ii./08,570.

L.G.B. in support of, for infants. One virtue lies in the fineness and softness of the curd formed by it. The hot roller process of desiccation and the method of spraying into hot air are mentioned—the variety made by the latter method is liable to change in flavour on keeping so far as the full-cream is concerned.—F. J. H. Coutts, L. i./18,509.

For infants, Milk in preference to Patent Foods. If Milk is cooked or pure dried Milk be used, fresh fruit juices or raw meat juice must supplement.—Infantile Scurvy, Lecture on.—T. D. Lister. M.P.C.ii./09,54.

Synthetic Milk. *Syn.* ✱**Solac** (T.M. 346263).

Soya Beans are ground to a coarse flour and stirred vigorously in an alkaline solution to extract the soluble proteins. The oil, which is nauseous to the taste, is carefully removed. Finally Arachis and Sesame Oils, Dextrin and the remaining salts of milk are added; after emulsifying, *B. Acid Lactic* is added. The average fat content is 3·5%.

Melco is also made using Pea Nuts as the source of Albumin. The methods are subjects of patents by W. J. Melhuish, Pr. Vol. X., No. 115, 80, P.J. ii./16,297; B.M.J. ii./15,646; i./18,430.

D. F. Ritchie writes that he experimented in the matter some years ago and found that a milk can be made by grinding up Soya Beans with a small quantity of water, and then adding enough water to make an emulsion, but Soya Beans as such cause considerable gastric disturbance.—P.J. ii./16,244; see also F. Goldby, P.J. ii./16,214.

Milk, Artificial Human.

New Milk 30, Cream 1¾, Milk Sugar 1⅛, Water 18.

Humanised Milk.—CAN. FORM.

Triturate 100 grains of a mixture of Pancreatin 7, Sodium Bicarbonate 28, and Milk Sugar 965,—with Water 2 ounces and transfer to a bottle containing cows' milk 2 ounces, and cream ½ ounce. Immerse this in water heated to 38° C. for ¼ hour. Afterwards bring to the boil.

Human Milk has the average composition:—Fat 3·4%, Milk Sugar 6·4%, Albuminoids 1·7% (Casein and Lactalbumen, *c.f.* p. 574), Mineral Matter 0·2%. Notice the difference between the human milk and cows' milk (*Vol. II.*) in the relationship between the albuminoids and the mineral matter.

According to a further investigation, it contains on the average more lactose, much less protein, and a greater percentage of substances of unknown nature with little or no Nitrogen in their composition. From beginning of the second month of lactation onwards the composition is:—

Fat 2 to 4%, Lactose 6 to 7·5%, Protein 0·7 to 1·5%.

Cow's Milk:—Fat 2 to 4%, Lactose 3·5 to 5%, Protein 2·5 to 4%.

The unknown substances are important constituents in diet. They are soluble in Alcohol and Ether—they are in greater abundance in human milk. during the early periods of lactation. At this time they may be 1%, falling to half the amount from the middle period of lactation. In cow's milk they are about 0·3% from the middle period.—Jl. Biol. Chem., Oct., 13, per B.M.J. ii./13,1499.

If artificial feeding has to be resorted to, healthy cow's milk should first be tried; that known as '**Nursery Milk**' is taken from tuberculin-tested cows and may be more usually relied on from large dairies than ordinary milk supply. As a general rule dilute with equal quantity of water. A grain of **Sodium Citrate** to the ounce will increase digestibility (5 and 10 grain **Tablets** are prepared *q.v.*), Milk Sugar, a drachm to the pint, is also a useful addition. Fresh Milk is better than Pasteurised, but in case of doubt Pasteurisation or the use of **Dried Milk** (*q.v.*) or Condensed Milk (containing not less than 13% fat) should be considered. Of the last mentioned use 1 teaspoonful of the sweetened variety to 3 ounces of water, adding 1 teaspoonful of cream. (Condensed Milk should not be given after the child is 4 months old.)

The action of Sodium Citrate in preventing milk clotting has not been thoroughly explained.—B.M.J. ii./13,711.

Sodium Citrated-Milk (2 grains to the ounce) makes whole milk feeding possible and removes necessity of diluting. Results equal to natural milk. —C. W. Vining, B.M.J. ii./15,457; see also R. D. Rudolph, *ibid*, p. 660.— Strongly in favour of undiluted milk heated in a jacketed pan for 40 minutes as advised by Budin, with addition of Sodium Citrate.

If none of the above are digested, **Peptonised Milk** must be given employing **Peptonising Powders** or **Liquor Pancreaticus** (*q.v.*). **After the child is six months old** a Malted Food may be given as a supplementary food, *but farinaceous foods of all kinds should be discouraged until the child has teeth.*—R. Hutchinson.

Infants' Food 'A' for children up to three months contains all the Milk Solids prepared with antiseptic precautions. Three to five heaped tablespoonsful to be added to a pint of water which has been brought to the boil (and kept boiling for fifteen minutes), and allowed to cool down slightly in a covered jug. When mixed for use this is practically identical in composition with human milk.

FOOD TIME TABLE.

Age of Child.	1 week.	2 to 3 weeks.	4 to 5 weeks.	6 to 12 weeks.	3 to 5 months.
To be fed during the day every	2 hours	2 hours	2 hours	2½ hours	3 hours
During the night	Twice	Twice	Once	Once	Once
Quantity of " A " Food to use for each meal (the amounts may be increased somewhat if digested).	1 to 1½ full-sized teaspoons	1½ to 3 full-sized teaspoons	2½ to 3½ full-sized teaspoons	3 to 4 full-sized teaspoons	4 to 5½ full-sized teaspoons
Quantity of Water for each meal	2 to 3 tablespoons (1 to 1½ ozs.)	3 to 6 tablespoons (1½ to 3 ozs.)	5 to 7 tablespoons (2½ to 3½ ozs.)	6 to 8 tablespoons (3 to 4 ozs.)	8 to 12 tablespoons (4 to 6 ozs.)

For bacteriological reasons and owing to the fact that the milk fat will rise to the surface on allowing to stand for a few hours, a sufficient quantity only for use at the time is to be prepared in order that the Food may be as fresh as possible at the time of administration.

Food ' B ' for Infants (from three to six months) **and Invalids** contains the milk solids with a small proportion of cereal carbohydrates treated to render them assimilable. Prepared for use as the latter.

Food 'C' for Infants (from six months and upwards) **and Invalids** similar to ' B ' with a larger proportion of farinaceous constituent. Five heaped tablespoonsful to be used to the pint of water as above.

Cocoa Food is also prepared.

Biscuit Foods.

Biscuit Powder 1½ lbs., Baked Wheat Flour 1 lb., Finest Ground Oatmeal 6 ozs., Milk Sugar 6 ozs., Powdered Malt 8 ozs., dried at a low temperature and mixed.

A better way is to bake into a biscuit the mixture of wheat flour, fine oatmeal and milk, then grind up and mix with the powdered malt.

For invalids a similar basis with the addition of a fourth part of lentil flour and an eighth part of locust bean powder is beneficial.

Another formula is :—Baked Flour 1 lb., Biscuit Powder 1 lb., Refined Sugar in powder 1 oz., Milk Sugar 6 ozs., Finest Oat Flour 8 ozs., Powdered Malt 4 ozs.—P.J. ii./09,334.—Note Hutchinson's remarks above.

Malted Foods described.—B.M.J. i./10,86.

INFANT MORTALITY.—The State should (1) Educate those about to become mothers as to how to feed their children—the proper nourishment being the mother's milk. (2) Pass a law forbidding all women about to become mothers from working in factories, etc. (3) Institute a system of pure fresh milk dairies. (4) *Re* care of child by the physician during whole of its infancy. (5) Sale of Patent Infant Foods to the public to be made illegal.—L. i./11,1203.

Breast Feeding.—The constituent of mother's milk on which the infant depends is ***Fat.*** The mother must be well nourished.—B.M.J. ii./10,1139.

Proprietary Foods in Infant Feeding.—Recent investigations of 106 foods showed that 70% consisted of baked flour. Advertising methods most misleading.—H. C. Cameron, B.M.J. ii./15,287.

Many proprietary Infants' Foods are *deficient in fat.* This may provide partial explanation of the characteristic liability to infection so frequently seen in fat but pasty babies reared on this type of food.—J. C. Drummond, L. ii./18,482. *c.f.* Vitamines.

The **Pasteurisation of Milk**—So-called "sterilising"—consists in raising it to the temperature of 70° C. (158° F.) and maintaining it at this temperature for 30 minutes. This effectually removes all pathogenic and the bulk of the non-pathogenic organisms. So treated, milk keeps sweet two or three days. The process may be approximately carried out by plugging convenient sized bottles filled with the quantity for one meal, heating in a pan surrounded with water to nearly boiling point, remove from the fire, cover with a clean cloth and allow to stand for half-an-hour. Then cool rapidly, and store in a cool place.

Pasteurisers are of two kinds.—'**Bulk,**' in which the milk remains for 20 minutes at 140 to 165° F., or '**Flash,**' in which the milk flows continuously through the apparatus at up to 180° F. It is then cooled. Either method kills pathogenic organisms, *e.g.*, tubercle, typhoid or diphtheria and reduces bacterial content in general. By heating above 165° F., the Lactic Acid producing organisms are more or less rapidly killed, whilst the more resistant putrefactive forms largely survive—hence this milk is of danger if kept later at temperatures favourable to bacterial growth. Milk pasteurised at above 165° F. for any time and afterwards kept at above 65° F. undergoes what may be called a "peptolytic" change allied to putrefation, and this may actually occur if pasteurisation took place at 170—175° F. **Milk must be kept cold—below 50° F.** (not in vacuum flasks or warm pantries). Similarly *boiling* milk and allowing to spontaneously cool is deprecated. Indeed, it may be well to add a sufficiency of Lactic Acid producing organisms to reproduce the original condition of the raw milk. Regarding the relative nutritive qualities of heated and unheated milk—the less heating the better. —R. T. Hewlett, Na., Feb. 6, 1913.

Control of Milk pasteurisation.—The minimum temperature requirements usually set are, for the continuous type of pasteuriser, 160° for one minute ; for the machine equipped with the holding device, 140° F. for twenty minutes. The percentage reduction standard usually adopted is a 99% reduction in the bacterial content of the raw product.—G. Koehler, Jl. A.M.A.

Milk heated in a closed vessel to 60° C. for 20 minutes becomes sterile as regards micro-organisms.—L. ii./13,1548.

To obviate the **constipating effect** of Pasteurised milk for infant feeding add 5 to 20 grains of *sodium bicarbonate* to the quart of milk, also a little milk sugar. The Sp. Gr. of the final product must be 1·033.—B.M.J. i./05,1182.

Next to Mother's Milk comes Cows' Milk *simply* brought to the boil (scalded) and *diluted with water* in the usual proportion. Barley or lime water according to this writer is not desirable (but *c.f.*, p. 573. Are infants capable of digesting starch ?) Sterilised Milk not good, —children may become anæmic. *It is often contaminated worse bacterially than ordinary milk. A lot of nonsense on sterilised milk has been written.* Gain in weight of a child is not everything,—not necessarily progress in development. Scalded milk and water, equal parts, every 2½ hours, brought a child up to normal after it had sampled four kinds of foods and two milk mixtures.—Burnet, Pr. Apl. '08,484.

Infantile scurvy in a child seven months old fed on sterilised milk. Treatment consisted in fresh milk and water 4 to 1 at intervals of 2½ hours for four days, fresh orange juice 1 ounce and raw meat juice (4 drachms) also given. Later undiluted milk in 5 ounce feeds with Sodium Citrate 6 grains to each feed. Swellings subsided and recovery. Probably the essential factor in producing the scurvy was the *prolonged sterilisation or boiling of the milk,*—the danger from milk which has only just been raised to the boiling point for a very short time seems fortunately to be infinitesimal.—L.i./11,662.

Antiscorbutic value of Cow's Milk. Investigation at Lister Institute.—B.M.J. ii./19,681.

The more nearly the proteins of food approximate in structure the tissue proteins the more completely satisfactory and easy of utilisation will they prove to be—this is, of course, of special importance to the newly-born infant with imperfectly developed digestive ferments. Mother's milk is an optimum diet at that period of life; no substitute can be produced for this. The constituents of cows' milk may be re-arranged to make them present in proportions almost exactly similar to those in breast milk, but, however completely we may humanise cows' milk, it is not in our power to make it human, nor to give to its proteins the peculiar stamp of specificity.—A. E. Garrod.—B.M.J. i./11,1414.

Boiled versus Unboiled Milk.—Experiments on animals fed with milk of another species. Such small differences as have been found in the nutritive values of raw and boiled milk have been in **favor of boiled milk.**—B.M.J. i./12,966; ex L.G.B. Report.

Mr. R. Mond stated that his experiments showed there is no danger of Tuberculosis being conveyed from the milk of tuberculous cows to human beings. He claims sterilised milk will not support life of kittens—they died within a fortnight of starvation. Sir Almroth Wright holds the result is due to the precipitation by boiling of the lime and Magnesium Salts.—C.D. i./14,5.

Suggestion to condense or dry all milk and distribute it packed in tins or bottles—thus saving expense.—E. Pritchard, 'Bedrock,' P.J. i./13,80.

The relation of the chemical composition of human milk to chronic diarrhœa and eczema in nurslings. The average newly-born infant needs daily a quantity of nutritive material sufficient to produce 300 calories. In human milk the abundance of the heat producing element, fat and sugar, is in striking contrast with the relative poverty in proteins and in salts. The amount of fat in human milk varies as the hour and the phase of the feed, and also according to the individual peculiarities of mothers, whilst the lactose is remarkable for the constancy of its amount, an average of 5·82%.—Pr. Feb. 1911, p. 282, *et seq.*

Milk boiled at home for 2 to 5 minutes is in every way to be preferred to fresh or commercially pasteurised milk.—J. Brennemann, J.Am.Med.Ass., 1916,67,1413, per P.J. i./17,23.

Raw cow's milk contains the antiscorbutic factor (vitamine). Infants fed on heated or dried milk should receive fresh fruit juice.—H. Chick and co-workers, L. i./18,1.

Condensed milks in the infant dietary.—L. ii./11,833,966.

Proprietary foods in infant feeding.—Excess of sugar in these is a common cause of infantile dyspepsia, especially amongst the poor. These foods (7 classes are described) have, however, a field of utility. Condensed milk with excessive sugar is liable to produce fermentative dyspepsia. For children over six months the low fat content is very liable to produce rickets.—B.M J. i./13,872. See also L. i./06,93.

Breast-feeding. The value of the **Test feed**—*i.e.* the amount of milk obtained by the infant at a single feed.—The infant being weighed before and after feeding on scales sensitive to 1 drachm avoir.—L. ii./11,677.

Rickets, a study of. In artificially fed infants the disease is often considered to be due to deficiency of fat and protein, with an excess of carbohydrate. These factors may apply to naturally fed children as well. Improper feeding, experimentally, was insufficient to account conclusively for the disease.—B.M.J. i./08,13 *et seq.*

The extreme importance of breast feeding.—H. K. Waller, L. ii./15,115.

Dental Caries and Foods, cows' milk is better.—B.M.J. ii./07,1485 *et seq.*; B.M.J. ii./10,617.

Composition and nutritive value of proprietary foods, consult Cautley in 'System of Dietetics,' *c.f.* B.M J. i./09,537.

For infant feeding, Fresh Cow's Milk ½ pint, Malt Extract 1 teaspoonful. Pasteurise the milk in a bottle, and after cooling 10 minutes add the Malt

Extract; boiled water or lime water may be used in customary manner as diluent. The casein is prevented from curdling and the caseinogen modified. Fine flocculi are produced in the stomach, easily acted on.—L. i./06, 1013. A little more malt would be better.—W. H. M.

INFANT FEEDING IN THE TROPICS.—In the absence of breast feeding, Dried Milk or a good brand of Condensed Milk is best.

In gastro-enteritis stop milk feeding and give nothing but warm albumen water in large quantities (20 to 40 ounces containing the whites of 3 or 4 eggs) according to age of child during 24 hours. Castor Oil a few drops. In dysentery stimulants are not to be used. Intestinal injections, Boric Acid, Simaruba, etc., essential.—B.M.J. ii./09,770.

BANANA FLOUR AS INFANTS' FOOD:—

One ounce of Banana Flour rubbed up with a pint of milk and then boiled for five minutes makes a satisfactory gruel. Prevents the formation of a leathery coagulum of casein, and satisfies the appetite of hungry infants.

The nutritive properties of banana flour are high as shown by the following composition:—Water 15·5, Albuminoids 2·5, Starch, Sugar, Gum, etc., 77·7, Oil 1·0, Fibre 0·7, Ash 2·7%—B M J. ii./10,1145. Some prefer a 'banana meal' which contains less fibre, but the crude flour is preferred by the author of this paper.

Are infants capable of digesting foods which contain starch? Infants from birth secrete an amylolytic ferment. The glands, notably the pancreas, can be trained by a starchy diet to secrete more. This can be begun shortly after birth in the case of bottle-fed infants. Barley water contains about 2% of starch. Mixed with an equal quantity of milk, this is beneficial, encouraging the growth of lactic acid bacilli and the formation of lactic acid, thus preventing the growth of proteolytic bacteria. Commence with a milk mixture containing not more than 0·5% of starch, and gradually increase the amount very slowly up to 3 to 5%. If the stools become very acid, or if they give a distinct starch reaction, the percentage of starch in the diet must be reduced.—L. ii./09,1343.

Sterilisers (for milk). Aymard's Patent is in use.

Milk contains more calcium than lime water. Milk is, therefore, of value in hæmorrhage—where it is desirable to increase the calcium in the blood—also in many forms of pneumonia. Butter-milk useful in typhoid and in gastro-intestinal disorders of children.—B.M.J. i./06,124.

In post-partum hæmorrhage ½ to 1 litre of milk by rectal injection is good as hæmostatic.—M.A. 1908,23.

Disturbances arising from milk feeding in children after the first year. Milk is not the only ideal food for infants. It is deficient in iron and fixed alkali, lacks purin bases entirely, and is unappetising. Pasteurisation thought to destroy the lactic acid bacilli and various enzymes. Diminish the milk and give vegetable and meat diet.—B.M.J. ii./11,487.

Whey Powder.

This is virtually Desiccated Milk deprived of fat and Casein. It has approximately the composition: Soluble Lactalbumen 14·25, Milk Sugar 74·45, Fats 0·27, Mineral Matter, chiefly Phosphate 9·8, Moisture 1·2%. It is practically sterile. It is employed in conjunction with cows' milk for producing a milk with a reduced proportion of Casein, and also of higher Sp. Gr., with the result that the amount of fluid is proportionally lessened. Or it may be prepared with water and cream,—the cream being low in Casein, sugar and ash, but high in fat, whilst the whey is low in fat, but high in ash, sugar and lactalbumen.

It may also be used alone to produce Milk Whey by dissolving in water.—*C.f.* B.M.J. i./09,1491.

Human Milk contains on an average 0·8% Casein and 0·6% Lactalbumen; **Cows' Milk** 2·7% to 3% Casein and 0·2 to 0·3% Lactalbumen. *C.f.* also p. 569 for other constituents and *Vol. II.* In diluting Cows' Milk with water to reduce the Casein content it is obvious that the deficiency in Lactalbumen is rendered still more in error.

It is also clear, if the above figures be correct, that a breast-fed child taking 1,000 Gm. of milk in a day, will receive 6 Gm. of Lactalbumen. *A child receiving, say,* 600 *Gm. of Cows' Milk would receive only* 1·8 *Gm., at most, of the same albumen. This lactalbumen is soluble, i.e., it does not undergo precipitation with acid and digestion with pepsin and pancreatin before assimilation.*

Arguing by analogy with the high albumen content in Colostrum which the newly born calf receives (*c.f. Vol. II.*) the advocates of Lactalbumen, as an addition to cows' milk for infants' milk, claim that it is important to supply the infant with a form of protein which makes small demand on the digestive glands, and which does not require much transformation before it can be absorbed.

Majax—Compound Sugar of Milk. A combination of Sugar of Milk with the Phosphates and other mineral salts of milk; used with cows' milk and water it produces practically human milk.

✱ **Secwa** (T.M. 335063).—Contains Fat 0·27, Soluble Lactalbumen 14·25, Mineral Matter 9·80, Milk Sugar 74·45%. A food having the original enzymes unaltered, can be used as an exclusive food for infants without fear of inducing scurvy due to the absence of Vitamines. For convalescents from dysentery, etc., or where other food cannot be assimilated. Secwa makes sweet liquid whey by adding the percentage of water taken out in the process of drying.

✱ **Laibose** (T.M. 314072).—For adults, 1 ounce (30 Gm.) with 3 or 4 parts of hot water. For infants, the fat, protein and carbohydrate can be varied according to amount of diluent. Prepared by evaporation *in vacuo* of a mixture of milk and wheat which has been converted into a soluble state by physiological means. It contains protein 18%, fat 17%, carbohydrate 55%, and ash (phosphates, etc.) 4%. Caloric value 131·2 for 1 ounce.

✱ **Glaxo** (T.M. 364394). An Infants' Food, containing more protein and somewhat less sugar than dried human milk. To prepare, it is mixed with hot water. Practical trials are stated to have given good results.—B.M.J. ii./08,1687.

✱ **Vitafer** (T.M. 324675, 333647, 347470).—A tonic food.

Dose.—Two teaspoonsful three or four times daily mixed with milk porridge, cocoa or any fluid food. For children under 10 three teaspoonsful daily; infants proportionately.

The "Lancet" found Protein not exclusively Casein as some is present as Milk Albumin. Moisture 6·3%, Mineral Matter 10·7%, total Protein 80·4%, Fat 2·6%. Total Phosphoric Acid as Glycerophosphates 3·84%.—L. ii./13,84.

Salicylic Milk has been suggested for use in chronic diarrhœa, this theory being that milk so treated will prove more resistant against decomposition.—Pres., May, 1910, p. 90.

Koumiss (Artificial). *Syn.* ✱ KEPHIR (T.M. 298465, Class 42).

Dissolve Grape Sugar ½ ounce in water 4 ounces, and add 20 grains of yeast and cow's milk 4 ounces. Place in a quart bottle and fill up with milk, cork and wire. Keep it cool and shake it frequently during four days. Koumiss thus prepared contains some alcohol (1 to 2%) and lactic acid (about 1 to 2%). The original Koumiss of the Tartars was made from mare's milk by using the peculiar Kephir ferment, which swells up on soaking in milk. This consisted in reality of yeast cells with certain bacteria (*B. Caucasicus*, Kern)

In some respects it resembles mother's milk more than cow's milk.

Uses.—A food used in the Caucasus as a stimulant in exhaustion and in convalescence of phthisis. Is recommended by Metchnikoff as a good nutritive, and also as an intestinal antiseptic. Is a specific in whooping cough. Is a diuretic, of use in chronic nephritis.—M.A. 1906,30.

Kephir Grains are available commercially. In tuberculosis and other wasting diseases. *See also Acidi Lactici Bacilli, Vol. II.*

Kefir Salieres.—Described as a pure ferment or lactose yeast.—L. 14,184.

Goat's Milk.—As regards physical and physiological properties this appears to lie between human and cow's milk. A baby at the age of seven weeks received a feed of 3 ozs. a day, the amount being increased as the natural supply failed, until at three months it was taking six feeds a day of 4 to 5 ounces each and nothing else—the milk was given straight as it came from the goat. Digestion was perfect and there was a gain in weight increasing from three to four ounces to from 6 to 8 ounces each week. A first class food requiring no preparation. The fat is both in large proportion and in finer globules. Goat's Milk is too much neglected.—B.M.J. i./11,622,754. Not only do goats not suffer from tuberculosis, but their milk has a wonderful effect on children, especially on such as have to be brought up artificially and with whom cow's milk disagrees.—Brit. Goat Society —*See also* L. i./14,422.

Casein Preparations.

Casein is the principal albuminoid constituent of milk and is present in solution in the aqueous portion of the milk as an alkali-albuminate (the alkali in milk is about 0·5%).* It is precipitated by dilute acids (*e.g.*, acetic acid, which is utilised in method of estimation, *v. Vol. II.*). Casein is, furthermore, thrown out of solution by the action of the **rennet ferment.** Casein is present in milk to the extent of 3 to 5% (usually about 3½%). Once thrown out of solution it is not readily dissolved again except with added alkali or hydrochloric acid. **Cheese** is chiefly casein with a little fat.

Flocculent Casein, *see* Casumen, *infra* (specially prepared) is, however, soluble in water.

∗**Savore** (T.M. 255039), a preparation of milk and cereal proteids and albumoses with carbohydrates.

∗**Plasmon** (T.M. 271845), a soluble milk albumin (Casein). Nutritive and easily digested. Plasmon biscuits, Arrowroot, Cocoa and Chocolate are prepared.

Contains Phosphorus in organic combination to extent of 1·46%. Total Phosphoric Acid found was 2·88%. Milk protein differs from other proteins in containing Phosphorus in combination.—L. i./09,1186.

For gastric ulcer, this and similar foods are much employed.

∗**Casumen** (T.M. 239,245), A soluble form of Casein (Flocculent Casein) containing a very high percentage of protein (90%). For use in all cases where there is poor nutrition. It contains practically no fat or sugar. It may be mixed with cocoa, chocolate, bread (10%) for diabetics, &c.

Soluble and other Caseins, Modes of Making.—P.J. ii./12,155.

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* Some hold that Casein exists as Caseinogen, and that this is converted into Casein by ferment. Schmidt states that Casein occurs in milk as Calcium Albuminate.

Pigmentum Casein, St. M.'s H. *Syn.* **Unguentum Caseinæ.** Casein 14, Potassium Carbonate ½, Glycerin 7, Vaselin 21, Zinc Oxide ½, Phenol ½, Water to 100. If good Casein be used we find this is almost too thick—add a little more water. A basis for skin medicaments. Thymol *q.s.* may be added to preserve it.

Other Food Preparations.

***Benger's Food** (T.M. 321,220). A wheaten flour preparation containing the natural amount of starch with Trypsin and Amylopsin. It is used with fresh milk or milk and water in proportion required, artificial digestion being stopped at any point by boiling. The Trypsin acts on the milk used. After 15 minutes self digestion the percentage of unconverted starch is 1·5. After 30 minutes 0·5. The digestion can be conducted for from 5 to 45 minutes as desired. It gives the body nourishment with complete or partial rest to the digestive system. The point of the preparation is that if the digestive system, however weak, can do any work at all, it should be given it to do to the extent of its power. The fat may be increased by adding cream or upper-milk.

Gluten.—*Syn.* VEGETABLE ALBUMEN. A protein mixture obtainable from wheat flour as an elastic mass when moist.

Preparation—Knead flour with about half its weight of water to produce a stiff dough. Knead further in running water till free from starch. Wheat Protein is digested in less time than the majority of animal proteins.

***Glidine** (T.M. 285328), a vegetable protein food made from wheat in yellowish powder, free from starch and containing albuminoids 96%, Lecithin 0·87% Carbohydrates and ash 3·1%. Nutritive and easily digested.

Consists almost entirely of Gluten, *v.* also B.M.J. ii./09,1352.

Ferroglidine Tablets contain each 0·025 Gm. Iron. For anæmia, chlorosis, and as a tonic in exhaustion and convalescence.

Biosol.—*Dose.*—1 tablespoonful with or without water 3 to 6 times a day before or after meals.

A preparation as a reconstructive tonic claimed by the inventor to contain all the elements found in the human body. Especial stress is laid on the mineral contents—even to a trace of Radium! It contains 6·6% Protein and 10% Carbohydrates.

DIABETIC FOODS.

Starchless Bread (both brown and white) also Biscuits and Flour are manufactured. These are generally **Gluten Products** (more or less free from Starch) and Bran foods. Previously they were the only foods available for diabetics. **Casein** (with eggs and butter) has latterly been employed. Casein bread and biscuits (Callard & Co., London) are free from Carbohydrates and are palatable.

It is best to give this casein bread with a weighed quantity of starchy bread when desired. 'Gluten Bread' may contain as much as 55% of starch. It *can* be made with 7% of starch, but it is not palatable.—B.M.J. i./13,77,148.

The **Iodine Test** is useful for the detection of Starch in so-called Starch Free Foods and should be applied in cases of doubt. A deep *violet* indicates *unaltered starch* ; partially altered starch will give a brownish colour. We are informed that many Continental Diabetic Foods offered for their palatability actually contain a *higher proportion of Starch than ordinary white bread.* Almonds and other nuts are also used for making bread and biscuits. Various **Sugarless Condiments**, foods and drinks are prepared. Saccharin is used as the sweetening agent.

The following lists may be useful in assisting the Selection of Foods for Diabetics :—

(i) ***Foods free from Carbohydrates*** or containing less than 1%,—Beef, Mutton, Lamb, Pork, Poultry, Game, Sweetbread, Tongue, Fish, Turtle, Lobster, Eggs, Butter, Cheshire, American, Dutch and Gorgonzola Cheeses, Lard, Gelatin and 'honest' Starch and Sugar free special foods.

(ii) ***Foods containing a low proportion of Carbohydrates*** (percentage of Carbohydrate is indicated).—Liver 1, Sausage (Pork) 1, Crab 1, Crayfish 1, Scallops 3, Asparagus 3, Celery 3, Cucumbers 3, Lettuce 3, Spinach 3, Oysters 4, Mussels 4, Stilton Cheese 3, Cheddar 4, Rhubarb 4, Tomatoes 4, Mixed Pickles 4, Cauliflower 5, Leeks 6, Radishes 6, Mushrooms 7, Water Melons 7.

(iii) ***Food rich in Carbohydrate***—Milk 5 or more, Whey 5, Oatmeal (thin gruel) 6, Strawberries 7, Turnips 8, Carrots 9, Beet (fresh), Cranberries and Pineapple 10, Oatmeal (boiled), Blackberries, Dried Peaches 11, Oranges 12, Parsnips, Apricots, Currants, Walnuts and Filberts 13, Apples and Pears 14, Macaroni (cooked) 16, Calves Foot Jelly, Artichokes, Peas (Green), Cherries and Almonds 17, Potatoes and Pears (dried) 18, Figs and Grapes 19, Plums 20, Boiled Potatoes 21, Bananas 22, Rice (boiled) 24, Tapioca Pudding and Cocoa-nuts 28, Chocolate 30, Mince-pie 38, Chestnuts (fresh) 42, Apple Pie 43, Bread (Brown) 47, Potatoes (fried chips) 47, Bread (White) 53, Rolls 56, Lentils (dried) 60, Bread (toasted) 61, Peas (dried) 62, Gingerbread 63, Macaroons 65, Sponge Cake 66, Oatmeal 67, Chestnuts (dried) 74, Sago 78, Tapioca 88, Arrowroot 97, Dried Fruits, *i.e.*, Apples, Apricots, Currants, Dates, Figs, Prunes, Raisins 62–78, Meal Flour, Rice, Macaroni, Vermicelli 70–80.

In the case of list (ii.) much of the Carbohydrates in some of them is in the form of Cellulose, which is not absorbed.

The majority of the above figures are from the analyses of Atwater and Bryant.—L. ii./11,1184.

ACCESSORY FOOD FACTORS.

At the present time it is not possible to state with certainty the chemical composition of these bodies to which the name *Vitamines* was originally given by Funk. (For numerous abstracts of this authority's papers and communications from others on the same subject, *See* Beri-Beri, *Vol. II.*)

That they are essential to growth can be shown by eliminating them from diet in animal experiments, for example, an animal fed merely on pure protein, fat, the carbohydrates and the inorganic salts of food will die within a short time. The old standing theories of nutrition have hence been greatly altered by this new branch of scientific investigation.

At the present time three main types of these substances are defined, namely the '**Fat Soluble A,**' '**Water Soluble B,**' and the '**Water Soluble C**' **Factors.**

A concise paper by J. C. Drummond (L. ii./18,482) deals with the importance of these factors in Infant Feeding. It is interesting to know that the 'A' factor is stable at 100° C., and probably at 140° C., the 'B' is comparatively stable at 100° C. and slowly destroyed at 120° C., while the 'C' factor is gradually destroyed above 50° C., and rapidly above 80° C.

With regard to the **Distribution** of these various factors, the following based on a table in the paper gives some idea—the one or more + signs indicates relatively a rough content of the factor, while the – shows absence.

Foodstuff.	'Fat Soluble A.'	'Water Soluble B' or Anti-beriberi factor.	'Water Soluble C' or Antiscorbutic factor.
Milk	+ +	+ +	+
Butter	+ + +	—	—
Cream	+ +	+	+ ?
Separated Milk	—	+ +	+
Egg Yolk	+ + +	+	?
Egg White	—	+	? —
Beef Fat	+ +	—	—
Lard	—	—	—
Margarine	—	—	—
Vegetable Oils	—	—	—
Cod Liver Oil	+ + +	—	—
Wheat, Whole Grain	+	+ +	—
Rice, Polished	—	—	—
White Bread	—	—	—
Whole Meal Bread	+	+ +	—
Cabbage, Fresh	+ +	+	+ + +
Spinach	+ +	+	+ + +
Oranges	—	—	+ + +
Onions, also Apples	?	—	+ + +
Lemon Juice			+ + +

Absence of the '**A**' **Factor** both by animal experiment and by observance of conditions amongst the poor where such foods as milk, butter and eggs are not available has been proved to be the fore-runner of malnutrition and rickets—a 'deficiency' disease.

The total absence of any of the factors in either Lard, Vegetable Oils, Margarine and White Bread is a serious contemplation. Note, however, that the majority of animal fats—fish oils in particular—contain a fair proportion of 'A' factor. *c.f.* E. Mellanby, L. i./19,407.

Prof. Halliburton (B.M.J. i./19,583) has reviewed the knowledge of these substances in a paper on deficiency diseases. Examples of this type of ailment are beri-beri, pellagra, scurvy (and rickets as above mentioned)—all caused by the lack of Vitamines. Obscure and apparently trivial complaints are probably also to be included.

'Water Soluble B' Factor which is removed in rice polishings may be termed the Anti-neurotic factor. Its absence has been proved to cause beri-beri.—*q.v.* for further considerations.

Atta, Indian Flour, contains the Aleurone layer and the wheat germ and is protective against beri-beri. Yeast Extract (Marmite) added to soldiers' diet.—W. H. Willcox, L. ii./17,677.

'Water Soluble C' Factor is the Antiscorbutic factor. Orange and lemon juice contain it in particular. It has been suggested in fact that makers of Citric Acid should devise a means of recovering the Vitamine from the Lemon Juice.—C.D., '19,304. *c.f.* Prof. Harden & Co-Workers' clinical results under Scurvy.—Therap. Index.

The practical importance of Vitamines. Milled rice and Beri-beri. F. Gowland Hopkins, B.M.J. i. /19,507.

Deficiency of Accessory Food Factors—influence on the intestines. Experiments on pigeons.—R. McCarrison, B.M.J. ii./19,36.

Dry Fruit Juice of high antiscorbutic value practicable.—B.M.J. i./20,709. *See also* M. E. D. Campbell and H. Chick, L. ii./19,320, and P. W. Bassett-Smith, L. i./20,1102.

Bywaters has shown that there are present in the soil bodies which may be called *auximones*—of the nature of vitamines. It has been seen, for example, that two adjoining fields differ markedly in fattening power on animals—in one it is assumed vitamines are wanting. J. S. White, P.J. ii./16,4.

Confectio Vitelli, Cerevisiæ Fermenti et Limonis Succi Recentis. *Syn.* **Omnevit.** *Martindale. Details under consideration on going to press.*

Dose.—½ teaspoonful increased as required.

A preparation containing these three constituents would appear to embody the three 'factors' to the best advantage.

Marylebone Cream. A 50% emulsion of Linseed Oil was used to add to diluted milk in place of cow's cream in making infants' foods, but the fat-soluble 'A' vitamine is absent from Linseed Oil.

'**University Cream**' is now used instead. Beef suet 40 ozs., Olive Oil 5 ozs., Syrup 25 ounces, Benzoic Acid 35 grains, Decoction of Irish Moss 70 ozs., water to 1 gallon. (Arachis Oil is better as an anti-rachitic factor). Melt the suet, add the oil and the Benzoic Acid. Heat the Moss Decoction to about 60° C., place in the emulsifier and add the fats at about the same temperature. Finally add the syrup and water. This keeps well and mixes well with milk.—C. H. Hampshire and G. E. G. Hawker, B.P. Conf., 1919.

✱ **Vitmar** (T.M. 389337). *Dose.*—An eggspoonful after meals every day. Described as a food containing the Fat Soluble (A) growth promoting, Water Soluble (B) antineurotic, Water Soluble (C) antiscorbutic Vitamines, suitable for backward and delicate children. The fat soluble portion is emulsified.

✱ **Vitamogen** (T.M. 363554). A food stated to be a means of supplying Vitamines readily taken which does not upset digestion for children and adults. In nervous affections, dyspepsia and malnutrition.

Mineral Matter 7·5%, Protein content 24·96%, Sugar 20·83%, Starch 26·25%, Fat 1·51%, Cellulose or Fibre 11·95%, gives a marked response for active enzymes.—L. i./17,381.

P1 NUX VOMICA (*Off.*).

P1 *and all preparations containing* 0·2% *or more of Strychnine.*

Antidotes. *See* **Strychnine.**

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in powder. Fr. Cx. (*vide infra*) approximates latter as a maximum dose during 24 hours.

The dried ripe seeds of *Strychnos Nux-vomica* (*Loganiaceæ*), imported from India and Ceylon, contain from 0·7 to 1·5% of Strychnine. *Off.* requires the drug in powder to be adjusted to 1·25% Strychnine. B.P. '98 was not standardised.

A minute quantity of copper is said to be present in the seeds, and this may colour mixtures made with Tinctures of Nux Vomica and Sal Volatile a bluish green shade. Fr. Cx. requires not less than 2, nor more than 3% (combined) alkaloids.

For further details on Assay of Nux Vomica see Vol. II.

Flavoring for Nux Vomica preparations, see Strychnine.

Uses.—A bitter stomachic and tonic. Stimulates the bowels, hence added to aperients. Increases nervous energy. Given to relieve shock and collapse from anæsthetics. Is employed in dyspepsia, heart weakness, and as a general tonic in all conditions of debility and neurasthenia.

In phosphaturia, small doses of Nux Vomica and of Diluted Hydrochloric Acid are often of great service.—Tirard Med. Treatment, p. 349.

P1 **Extractum Nucis Vomicæ ('Siccum')** (*Off.* and B.P. 1898).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

Contains 5% of Strychnine, now adjusted with Calcium Phosphate *vice* milk sugar.

U.S. VIII. was a liquid acetic extract freed from inert matter with alcohol—dried, adjusted to 5% Strychnine, and powdered, but U.S. IX. is practically F.I. in menstruum and Assay requirement (total Alkaloids). It is in form of a powder, Starch and Magnesium Oxide being used as diluent. *Average dose.*—¼ grain.

F.I. prepares with Alcohol 70% and alkaloidal strength 15%; this refers to total Alkaloids, and is unsatisfactory. Fr. Cx. conforms with F.I. making the preparation 16% total alkaloids, with *max. single dose* ⅝ grain and max. in 24 hours 1½ grains approx. Nux Vomica Extract elsewhere abroad is called **Extractum Strychni.**

P1 **Extractum Nucis Vomicæ Liquidum** (*Off.* and B.P. 1898).

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

Prepared by re-percolating the seeds in powder with Alcohol 70% (60% is adequate and it leaves the fat behind), defatting with Hard Paraffin, and adjusting the strength so that the extract contains 1·5% of Strychnine as in B.P. '98.

P1 **Fluidextractum Nucis Vomicæ, U.S.** VIII.

Aceto-alcoholic, contains 1% Strychnine. U.S. IX. is hydro-alcoholic and is assayed to approx. 2·5% total alkaloids. *Average dose.*—1 minim.

Ⓟ **Tinctura Nucis Vomicæ** (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), often less.

This contains 0·125% of strychnine, and is made on the lines of B.P. '98. One ounce contains about ½ grain of strychnine, or about half the quantity in the Tincture of B.P. '98, and the same strength as B.P. '85. It now = approx. F.I.

Fr. Cx. prepares by dissolving 1·562 Gm. Extract (Fr. Cx.) in Alcohol 70% *q.s.* to produce 100 Gm. This contains 0·25% combined alkaloids (F.I.) Max. single *dose*, 19 minims. Max. during 24 hours 95 minims approximately.

Ⓟ**U.S.** VIII. 1 in 50 of Alcohol (94·9 % vol.) and water in proportion of 750 and 250. Strychnine 0·1%. U.S. IX. is a 1 in 10 Tincture adjusted to 0·25% Alkaloids (Total).

P1 **Tablets** equal **5** and **10 minims of the tincture.**

Varicose veins have been treated with an application containing Nux Vomica. The legs to be rubbed very lightly from top to bottom, night and morning, with a piece of flannel soaked in an application composed of Nux Vomica Tincture 5, Hamamelis Tincture 4, Eau de Cologne to 100.

Each morning the patient to take a bath of 20 minutes' duration of water at 35° C. (95° F.) in which 500 Gm. (17½ ounces avoir.) sodium bicarbonate has been dissolved. The bath to be followed by a rest of half an hour.—Pres.

Ⓟ**Tinctura Ignatiæ.**

Dose.—3 to 20 minims (**0·2 to 1·2 Cc.**).

From St. Ignatius' Beans, the seeds of *Strychnos Ignatii* (*Loganiaceæ*) (containing about 1½% Strychnine and 1% Brucine)* 1 part, and a mixture of 90% Alcohol 3 and Water 1, *q.s.* to produce 10 parts. A preparation known as **P1** **Gouttes Amères de Baumé** (Fr. Cx.), is of strength 1 in 5. *Max. single dose* 4 minims. Max during 24 hours 30 minims approximately.

OLEA ESSENTIALIA.

The various essential oils used in medicine prepared either by distillation or expression, or a combination of the two, are dealt with under their respective headings.

For processes of Assay of Essential oils see Vol. II.

Antiseptic Powers of certain Essential Oils.

The Carbolic Coefficients obtained by us under certain conditions (*vide Vol. II.*), for Essential Oils, show that several possess considerable antiseptic power. For example, Origanum Oil (containing over 80% Phenols, *e.g.*, Carvacrol), had almost the same coefficient as Thymol—an acknowledged excellent antiseptic, viz., 25 to 26. Following these came Oil of Thyme containing less Phenols, then Geraniol, Cinnamon Oils, Clove Oil, and so on in this order.

As an outcome of our investigations Saponaceous Solutions of some of the Essential Oils are prepared for physicians' use under the name—**Perfumed Formosyls** as follows:

Almond.
Cassia.
Cinnamon.
Citronella.
Eucalyptus (Amygdalina).
Eucalyptus (Globulus).
Geranium.
Lavender.
Lemon.
Origanum.
Otto of Roses.
Rosemary.
Thyme.
Wintergreen.

Uses.—For disinfection of the hands and skin. A tablespoonful to be poured in the palm of the hand and well rubbed and lathered with an equal quantity of water for two minutes. For treatment of skin affections local use as paints or lotions is suggested. (Individual preference as to aroma may be taken into account).

The strength of these Perfumed Formosyls is so arranged that when using any of them as directed above the suggested quantity contains sufficient Essential Oil to act as an efficient bactericide—indeed, an excess is present—in the light of knowledge which we have obtained comparatively with Carbolic Acid.

Terpeneless and Sesquiterpeneless Essential Oils are described in *Vol. II.*

OLEATA.

Acidum Oleicum. U.S. **P. Jap.**

$$CH_3(CH_2)_7CH : CH(CH_2)_7COOH = 282{\cdot}362.$$

A pale-sherry coloured faintly acid oily liquid (at ordinary temperatures) with a slight odour. ***Solubility,*** readily in 90% alcohol, ether, chloroform, benzol, and fixed oils : insoluble in water ; it dissolves most metallic oxides, thus forming indefinite oleic solutions of oleates in an excess of Oleic Acid; such combinations of bismuth, copper, lead, mercury, and zinc are used medicinally; they are soluble in fats. Mercuric Oleate made this way is better than the B.P. '98. Oleic Acid also dissolves alkaloids, but not their salts, *e.g.*, Oleate of Aconitine, Oleate of Atropine (2½% perfumed with Otto), Oleate of Morphine and Oleate of Veratrine are used medicinally. Oleic Acid is much more readily absorbed by the skin than oils. It also aids the absorption of drugs with which it is combined.

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* Fr. Cx. requires about 2·5% combined alkaloids. *Max. single dose* of the powdered Beans 1½ grains, *Max.* during 24 hours 5 grains approx.

The splitting up of Oleic Acid into Pelargonic and Azelaic Acid shows position of the double link.—L. i./09,598.

$$C_8H_{17}CH : CH.C_7H_{14}.COOH + 2O_2 = \underset{\text{Pelargonic Acid.}}{C_8H_{17}COOH} + \underset{\text{Azelaic Acid.}}{COOH.C_7H_{14}COOH.}$$

Conversion of Unsaturated Fatty Acids into Saturated, *e.g.*, Oleic into Stearic Acid—$C_{18}H_{34}O_2 + H_2 = C_{18}H_{36}O_2$. This achievement—a matter of great importance in the Oil industry—has been effected by bringing the Hydrogen and the liquid fat together at high temperatures in the presence of finely divided Nickel (or Cobalt, Platinum, etc.) as catalytic agent. The products are used both for food and for soap making.—P.J. i./13,97.

Pharmacology.—Subcutaneous injections of Oleic Acid Soaps cause anæmia.—A. E Boycott, B.M.J. ii./10,1420.

To prepare pure Metallic Oleates—Caspari recommends the preparation of (*a*) Sodium Oleate and (*b*) Potassium Oleate Solutions in place of ordinary Soap solutions. (*a*) Warm 1,217 grains Oleic Acid to 60° C. and add slowly 192 grains Sodium Hydroxide (90%) dissolved in a mixture of 2 ounces Distilled Water and 6 drachms of Alcohol, stirring constantly until acid neutralised (use Phenolphthalein Solution). Dissolve finally in 3 pints of water and filter. (*b*) Neutralise 410 grains Potassium Bicarbonate with 1,156 grains Oleic Acid in 1 pint of water by boiling. When cold make up to 3 pints. To the Solution (*a*) add Lead Acetate crystallised 819 grains, Copper Sulphate 540 grains, Zinc Sulphate 621 grains, Mercuric Nitrate 711 grains, or to (*b*) Lead Acetate crystallised 777 grains, Copper Sulphate 510 grains, Zinc Sulphate 591 grains, or Mercuric Nitrate 675 grains, each dissolved in 1½ pints of water to produce the corresponding pure Oleates.

Capsules of Oleic Acid, 7½ minims. *Dose.*—One or two daily.

These are given for hepatic colic, and to hinder the formation of gall stones. Best taken in the morning on an empty stomach.

$\boxed{\text{P1}}$ Oleanodyne.

A special preparation combining the alkaloids aconitine, atropine, morphine, and veratrine, with oleic acid. It is rapidly absorbed, and forms a strong anodyne liniment, which can be diluted with chloroform, alcohol, or oils. It is not so compatible with compound camphor or soap liniment.

Cupri Oleas, Copper Oleate.

$(C_{17}H_{33}COO)_2Cu = 626{\cdot}278$. (Theoretical formula for Pure Oleate.)

Add a hot solution of copper sulphate 3 in 8 of water to a hot solution of Castile Soap 8 in 32 and wash and dry the precipitate. When cold it is in solid dark-green masses. It is an oleo-palmitate of copper, containing copper equivalent to about 10% Cupric Oxide. Soluble in ether.

Unguentum Cupri Oleatis (U.C.H.).

Copper Oleate 12, Yellow Soft Paraffin 88. Melt together. For some purposes it may be employed half strength.

Is specially useful in ringworm—lightly rubbed in night and morning,—for indolent ulcers, warts and corns, and has been used to remove freckles.

Bougies of Copper Oleate are prepared 4 inches long containing each 5 grains (0·3 Gm.) Copper Oleate with Theobroma basis. For treatment of malignant disease. These bougies are useful adjuvants to the Sodium Coumarate treatment, reaction to treatment being more readily obtained with their aid.—L. Drage.

Ovules of Copper Oleate, with Cacao Butter basis contain 5 grains Copper Oleate. Used in the treatment of malignant disease (Drage). These have been found of value in uterine and vaginal cancer in conjunction with the *Coumaric treatment, q.v.*

Ⓟ **Emplastrum Cupri Oleatis** contains 20% of Copper Oleate made with Soap Plaster spread on Adhesive Plaster. Employed as adjuvant to the *Coumaric Treatment, q.v.*, of malignant disease of breast, rectum, &c.

Hydrargyri Oleas. Mercuric Oleate. *Off.* 20% Oxide.

The 1898 B.P. method was intended to produce normal Oleate, but it did not work well. That of *B.P.* 1885 by acting on Mercuric Oxide with Oleic Acid is now re-adopted, using slight warmth, (B.P. '85 was 10%).

Unguentum Hydrargyri Oleatis (*Off.* and B.P. 1898).

Mercuric Oleate 1, Benzoated Lard 3.

'**Capsungs**' of this ointment are prepared containing ½ drachm in each for inunction.

P1 Oleatum Hydrargyri (10%) **cum Morphina.**

Morphine (base) 1, is dissolved in 60 of the above. Linimentum Hydrargyri Oleatis cum Morphina, R.O.H., is similar. For use where the plain Oleate causes pain.

Oleatum Hydrargyri Liquidum, 5%.

Is prepared with one half as much oxide as the 10% and when ordered with morphine, 1 part is added to 60 parts of the oleate *when dispensed.* The 10% is always dispensed unless one of the others is specially ordered. They should be applied with a brush without much friction.

Uses of Mercuric Oleate Preparations.—For syphilis in secondary and tertiary stages. The application does not salivate unless used in excessive quantity. In persistent inflammation, especially of glands, and joints (such as synovitis), and in non-ulcerated syphiloderma, the Oleates of Mercury are much more active, definite, and cleanly, than the mercurial ointment. They are very effective parasiticides for pediculi. Ringworm has been cured by them, but Croton Oil (*q.v.*) is also used and if extensive the X-ray treatment will cure it.

In rheumatoid arthritis the joints thickened by fibrous adhesions and fibroid thickenings of the synovial and periarticular tissues should be treated with Mercuric Oleate with Morphine Hydrochloride ½ grain in 1 drachm added.—B.M.J. ii./10,305.

Oleatum Hydrargyri cum Sulphure.

Mercuric Oleate 5%, 4, Precipitated Sulphur 1, Ether 3.

For pediculi pubis.

Unguentum Hydrargyri Oleatis Compositum. — BROOKE'S OINTMENT.—Mercuric Oleate Ointment (5%), Compound Zinc Paste (Lassar's Paste) of each 41, Salicylic Acid 6, Ichthyol 12.

In (Septic) œdema of the face—applied covered with cotton wool in thick layer and pressed down by cotton elastic bandage—at bed time.—B.M.J. ii./09,934.

Syphilitic Disease of the Nervous System. It is not advisable to give Potassium Iodide and Mercury together in full doses, except in a very urgent case. A drachm of the 10% oleate should be rubbed in near the affected part twice daily for three or four days, and then once daily for remainder of the week; near the scalp if in the brain, and down the back if in the spinal cord; treatment to be brief, to last eight weeks or so, and be renewed after two, four or six months.—Gowers, B.M.J. i./03,773.

Hydrargyri Stearas, Mercuric Stearate.

$(C_{17}H_{35}COO)_2\ Hg=767{\cdot}34.$

A stiff greyish unctuous paste formed by the interaction of mercuric chloride and curd soap. In other respects it resembles mercuric oleate.

Mercuric Stearate can be made by precipitation, *e.g.* Dissolve Curd Soap 96 in Water (Boiling) 480, add Mercuric Chloride 32 in Boiling Water 320—boil, collect and wash precipitate. It is more satisfactory (and the product more genuine) by direct combination of Mercuric Oxide 10, with Stearic Acid 26.—Melt the acid and gradually stir in the oxide until all dissolved—a sand bath may be necessary and a little more than the above amount of Stearic Acid may be required.

Ⓟ **Emplastrum Hydrargyri Stearatis.**

Lead Plaster 6, melt and add Mercuric Stearate 2. Is a substitute for mercurial plaster, and for joints requiring Mercurial treatment, but pharmaceutically inelegant.

[P1] **Emplastrum Plumbi** (*Off.*). *Syn.* DIACHYLON PLASTER.

[P1] *Lead in combination with Oleic Acid or other higher fatty acids, whether sold as Diachylon or under any other designation (except Machine spread Plasters)—From May 27/17. We have followed the letter of the law by placing* '**Preparations of**' *in* Ⓟ. *Obviously in doubtful cases they should be treated as* [P1].

Lead Plaster is a crude Oleate of Lead, made by the combination of olive oil (oleate and palmitate of glyceryl) and oxide of lead heated together in the presence of water. Thus made, the oleate is more adhesive than when prepared by the oleic acid solution of the oxide.

This is used as an abortifacient in the Midland Counties.—B.M.J. i./05,584, 653; i./06,456.

Diachylon Pill poisoning (taken to produce abortion). *Treatment*, Sodium Monosulphite 1/3 grain with Tincture of Cardamoms thrice daily. Recovery. A powerful and dangerous ecbolic.—B.M.J. i./13,1199. Poisoning by: Treatment by potassium iodide, opium and bismuth —B.M.J. i./06,259.

Ⓟ **Emplastrum Resinæ, Adhesive Plaster** (*Off.* and B.P. 1898). Is more adhesive than Lead Plaster. Ⓟ **Emplastrum Saponis** is similar, but less adherent than the latter.

Ⓟ **Emplastrum Adhesivum, U.S., VIII.**

Melt Rubber 20, at not exceeding 150° C. (302° F.), add Petrolatum 20, and heat until rubber is dissolved. Add Lead Plaster 960, and then strain

The following ointments are prescribed for eczema, excessive perspiration of the feet, &c.

Ⓟ **Unguentum Diachyli.**

Lead plaster 1, Yellow Soft Paraffin, 1.

Melt together and stir till cold. Made thus, the ointment keeps well, and does not acquire a disagreeable odour.

Ⓟ *Unguentum Diachyli Carbolisatum* (Lassar) is the same with 2% of phenol.

To be rubbed in 1 to 3 times a day, or spread on linen and applied as a plaster. **U.S.** has Lead Plaster 50, Soft Paraffin 49, Lavender Oil 1.

Thorii Oleas *v.* Thorium Compounds.

Unguentum Zinci Oleatis (*Off.* and B.P. 1898).

Precipitated Zinc Oleate (now prepared somewhat differently from B.P. '98) 1, Soft Paraffin, White 1. Melt together and stir till cold. For some cases further dilution with Soft Paraffin is advisable. This ointment will cure chronic eczema.

Zinci Oleas—*Syn.* ZINC OLEO-STEARATE. (*Off.*).

$(C_{17}H_{33}COO)_2Zn=628{\cdot}078$. Theoretical formula for the Oleate.

Manufacture—B.P. 1914 employs a solution of Hard Soap 2, and Curd Soap 1 in Water 15, and adds to it Zinc Sulphate 1 in water 2. This makes a *harder* preparation than the following:—

Hard Soap in shavings 16, Boiling Water 120; heat to dissolve. Zinc Sulphate 8, Boiling Water 16; dissolve and add to former solution; stir well, separate the water from the Oleate, and wash the latter with hot water till free from sulphate, cool, and dry. Reduced to powder is useful for dusting on eczematous surfaces and for excessive perspiration. It may be perfumed by the addition of $\frac{1}{500}$ of thymol, and diluted with kaolin or starch.

Ⓟ **Unguentum Oleatorum, G.H.**

Zinc Oleate Ointment, Diachylon Ointment and Mercury Oleate Ointment of each equal parts.

Further Metallic Oleates:—

The following working formulæ are the results of our experiments. Several of these compounds would be well worth therapeutic trial. —*c.f.*, G. I. Mackay,—P.J, /i./11,269.

General method of preparation.—

Except where otherwise stated, to 3 pints of the Soap Solution (*a*). (*v.* p. 582) boiling, add slowly with stirring the amounts stated of the salts in 1½ pints of water also boiling, wash, precipitate by decanting, and dry. As a general rule it is desirable to have the *solutions of the salts* in slight excess.

Argenti Oleas. Ag. $C_{18}H_{33}O_2$ = 389·234.

Dose (suggested).—¼ to ½ grain (**0·016 to 0·03 Gm.**).

Manufacture.—Use Silver Nitrate 740 grains in 1½ pints of water with the general directions, p. 582.

Silver Oleate forms a white powder, becoming dark on exposure.

Soluble—slightly in ether and slightly in alcohol.

Uses.—Should prove useful locally, strengths being guided by corresponding Silver Nitrate preparations (bougies and ointments).

It is stated to have high bactericidal power. It is readily absorbed. May be of use in eye affections (dilute ointments). Its solution in Oleic Acid does not stain the skin (Mackay).

Bismuthi Oleas. $Bi_2O.(C_{18}H_{33}O_2)_4 = 1557{\cdot}416$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) but larger amounts would be used in X-ray work.

Manufacture.—Dissolve Bismuth Nitrate (cryst.) 960 grains in Glycerin, 40 ounces by weight in the cold. Add to the solution 3 pints of the Sodium Oleate solution (p. 582), wash by decanting, collect and dry. A greyish white unctuous substance.

Soluble with some decomposition slightly in Alcohol and Ether,

Uses.—Should prove useful in place of Subnitrate or Carbonate in X-ray diagnosis : It would not be attacked so readily by the stomach juices. Might be tried instead of other Bismuth compounds, *e.g.* to form a coating on the stomach or intestines in gastric ulcer.

Ferri Oleas. $Fe(C_{18}H_{33}O_2)_3 = 899{\cdot}902$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufacture.—Use Ferric Chloride ($+12\ H_2O$) 790 grains with the general directions, p. 582. A hard reddish brown mass.

Soluble—fairly in ether and very soluble in alcohol (by experiment).

Gelatin Capsules contain 5 grains.

Uses.—These have been given in anæmia as a succedaneum to Ferrous Carbonate. Should prove of greater value than the Perchloride.

Ferrous Oleate. $Fe(C_1\ H_{33}O_2)_2 = 618{\cdot}548$.

Is of green color but oxidises rapidly.

Stanni Oleas. $Sn(C_{18}H_{33}O_2)_4$ (?) $= 1244{\cdot}116$.

Dose.—Not used internally.

Manufacture.—Add Stannic Chloride, 566 grains dissolved in the smallest quantity of water to 3 pints of the soap solution (*v.*p.582)

Uses.—Has been employed in diseases of the nails—overcomes brittleness, splitting, etc.—Squire.

Strontii Oleas. $Sr(C_{18}H_{33}O_2)_2 = 650{\cdot}338$.

Dose.—(suggested) 5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufacture.—Use Strontium Nitrate, 470 grains in 1½ pints boiling water with the general directions, pp. 582, 585.

A hard white mass *soluble* (by expt.) in ether ; slightly in alcohol.

Uses.—Should possess properties of the Strontium Salts—probably to a less degree and with more prolonged effect.

Barii Oleas. $Ba(C_{18}H_{33}O_2)_2 = 700{\cdot}078$.

Dose.—Not suggested for internal use but as local application in Creams and Ointments in skin affections, with caution as to proportion. The Oleate, a white unctuous substance, as such had no ill effect on healthy skin.

Manufacture.—Use Barium Chloride, 500 grains, with the general directions, pp. 582, 585.

Uranii Oleas. $UO_2(C_{18}H_{33}O_2)_2 = 832{\cdot}908$.

Dose (suggested).—½ to 5 grains (**0·03 to 0·3 Gm.**).

Manufacture.—Employ Uranium Nitrate 1092 grains with the general directions, pp. 582, 585.

A yellow substance of plastic consistence.

Uses.—Possesses radio-active properties. Suitable for local use to malignant growths and in skin affections as **Unguentum Uranii Oleatis.**—25% strength in Unguentum Lanolini softened if necessary *c.f.* **Unguentum Thorii Oleatis.**

Calcii Oleas. $Ca(C_{18}H_{33}O_2)_2$ = 602·778.

Dose.—5 to 15 grains (0·3 to 1 Gm.).

Manufacture.—Employ Calcium Chloride, 240 grains (fused Anhydrous) with the general directions pp. 582, 585.

A granular mass slightly soluble in Alcohol and Ether.

Uses.—May be representative of other Calcium Salts. This salt of (Unsaturated) Oleic Acid may be tolerated whilst the Palmitate and Stearate when formed as a product in the system are said to be irritating, *c.f.* p. 250, and B.M.J. i./11,500.

Magnesii Oleas. $Mg.(C_{18}H_{33}O_2)_2$ = 587·028.

Dose.—10 to 30 grains (0·6 to 2·0 Gm.).

Manufacture.—Employ Magnesium Sulphate, 540 grains with the general directions, pp. 582, 585. A moderately hard white mass.

Soluble—slightly in Alcohol and more so in Ether.

Uses.—This compound we have found by trials to possess prompt purgative action. 15 grains in two individuals had this effect within 3 hours. **Pills** of Magnesium Oleate contain 5 grains each, and **Capsules** contain 10 grains.

OLEUM CHAULMOOGRÆ incorrectly termed Oleum Gynocardiæ (I.C. Add.).

Dose.—5 to 10 minims (0·3 to 0·6 Cc.), increased to 1 drachm (4 Cc.) in capsules, cod-liver oil, or milk.

The oil expressed from the seeds of *Taraktogenos Kurzii*, imported from India.

Taraktogenos Kurzii—*King*—is an evergreen shrub growing in Chittagong, Burma, and parts of Assam only. The fruits yielding genuine Chaulmoogra Oil are distinguished from those of Gynocardia by containing *many* seeds (average 21) packed close together and facetted by mutual pressure, hence no two are the same identical shape, and having no pulp the embryo is vertical and cordate, while that of Gynocardia is lateral and reniform.

The oil from *Taraktogenos Kurzii* is cold-drawn. It is a yellow oil with an odour of rancid butter. It has a constant melting point of 22—23° C. It constitutes about 33% of the seed. The residual cake is valuable for cattle feeding. In pressing—without decorticating—it is important to wash the seeds first or the product is dark coloured. If decorticated first the washing is not necessary.

Owing to the almost complete failure of the 1912 crop of Taraktogenos Kurzii (a Hydnocarpus) practically the whole of the Oil on the European markets for a year or more was spurious and was obtained from the allied **Hydnocarpus Wightiana** or **Asteriastigma Macrocarpa** growing in South and West India only. These spurious Oils differ in colour, odour, specific gravity and content of Chaulmoogric Acid and have M.pt. 26° C.

Gynocardia Odorata Oil has a brown colour and odour resembling painter's varnish and remains liquid at ordinary temperature down to 40° F. It is stated to have no therapeutic value in leprosy. —E. E. Francis, Chief Medical Officer, Assam Bengal Ry., Chittagong, *c.f.*, also C.D. i./14,407. It does not contain Chaulmoogric Acid but consists chiefly of the Glyceryl esters of Linolic and Linolinic Acids. P.J. i./05,856 and L. ii./05,982. (Power and Barrowcliff's investigations).

The Agricultural Ledger, 1905, No. 5 (Vegetable Product Series, No. 92) gives a detailed account of the drug as at that time by D. Hooper.

Seeds of *G. Odorata* contain a cyanogenetic glucoside—gynocardin, and a hydrolytic enzyme gynocardase.—Pres. 1910, p. 66.

Uses—The oil is applied externally, and given internally *after meals* for leprosy, phthisis, scrofula, rheumatism, marasmus, psoriasis, and lupus. The treatment of leprosy with it has to be persisted in for several years.

The theory of its action in leprosy seems to be that it increases the number of leucocytes and enhances the bactericidal properties of the blood.

For phthisis 2 to 4 ounces should be rubbed into the chest weekly. Applied to raw surfaces, however, causes great pain.

Leprosy is also well treated by half-ounce doses per rectum daily.

A case of lepra tuberosa, approximate recovery under.—L ii./06, 1506.

In the knowledge of the writers a patient suffering from leprosy took over a long period a large quantity of Chaulmoogra Oil Capsules. The dosage employed was two 15 minim Capsules four times daily, increased. He found that he could take up to 200 minims per diem, but larger quantities had a tendency to make him sick. The spots on the face and hands disappeared almost entirely, but there remained the deadened feeling of the tissues of which there was hope of complete disappearance.

Emulsio Olei Chaulmoogræ.

Dose.—½ to 1 drachm (**2 to 4 Gm.**).

We found the following formula satisfactory to produce a liquid Chaulmoogra preparation :—

Chaulmoogra Oil 1 ounce, Poppy Seed Oil 2 ounces, Powdered Gum Acacia ¾ ounce, Cinnamon Oil 6 minims, Saccharin Elixir 45 minims, with Water to make 6 ounces.

In leprosy in Egypt Chaulmoogra Oil as far as cure of the disease is concerned has been found wanting, although it is useful for alleviation of symptoms, others still consider it of great use. Patients must refrain during treatment, which may extend over three or more years, from salted food such as fish, cheese and vegetables.—L. ii./11,467.

Further trials of Chaulmoogra Oil in leprosy with benefit.—Lancet, Mar. 7, 1914.

Injectio Olei Chaulmoogræ. Heiser's Injection.

Chaulmoogra Oil 60, Camphorated Oil 60, Resorcin 4. Heat on water bath to dissolve and filter. *Dose.*—1 Cc. increased to tolerance. In leprosy said to produce apparent cures or great improvement.—American Journal of Tropical Diseases and Preventive Medicine per Journal of the American Medical Association, December 19th, 1914,2258; L. i./15,616; P.J. i./15,160.

McCoy and Hollman, Public Health Bull, 75, January, 1916, Washington (L. i./16,790) have found the injection of oily preparations of Chaulmoogra badly tolerated—causing abscess, heart failure, etc.—in cases treated at the Hawaii Settlement. (Sodium Chaulmoograte 'C' on the other hand is tolerated).

Spontaneous remissions of leprosy. Spontaneous apparent cures occur. A cure must stand the test of time—five years or more. In South Africa (Robben Island and elsewhere) for advanced nodular stages. Chaulmoogra Oil intramuscularly 3 to 5 Cc. at a time repeated every three days for five months or more, if patient can stand it, is considered the best palliative so far. The purified oil to be given internally in 15 minim capules.—L. ii./13,1529. *See also Leprosy Bacillus, Vol. II.*

Capsules of Chaulmoogra Oil contain 5, 10 and 20 grains.

Unguentum Chaulmoogræ (*Off.*) *Syn.* UNGUENTUM GYNOCARDIÆ, I.C. Add. 10% in Paraffin basis.

Sodii Chaulmoogras, Pure Commercial, from genuine *Taraktogenos Kurzii* Oil.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) thrice daily or to limit of toleration. Our conception is that if, as indeed we believe, there is curative value in Chaulmoogra against leprosy, the drug should be absorbed sufficient to saturate the system and it should be given over a prolonged period.

Manufacture.—Saponify genuine *Taraktogenos* oil by boiling with a sufficiency of strong soda lye and throw out the acid with hydrochloric acid. Wash with warm water until the wash liquor is free from acid and convert into the sodium salt.

Chemical Data.

In our earlier work we made the name Gynocardic Acid synonymous with Chaulmoogric Acid but we are now falling into line in the matter merely pointing out that those who wish to retain the name Gynocardic Acid for a substance —now of purely historical interest—(Moss gave the name Gynocardic Acid to a 'residual' acid—evidently a very small quantity—obtained after removing Chaulmoogric and Palmitic Acids—Moss's Gynocardic Acid had melting point 29° C.)—acknowledge themselves that it is a "*mixture*" of several substances present only in very small amount—*vide* Pyman· B.M.J. ii./16 550 and Power and Gornall, P.J. i./04,831.

We now therefore discard the name Gynocardic Acid altogether.

Fractionation of Chaulmoogric Acid into portions.

The acids present in Chaulmoogra Oil are combined as glycerides. We have saponified the oil, and subdivided the acids into two main groups as described below in the form of their sodium salts, for special purposes.

Power and Gornall, J.C.S. 1904, P.J. i./04,831, found the acids of Taraktogenos Oil to consist chiefly of several homologous acids of series $C_nH_{2n-4}O_2$. The highest member $C_{18}H_{32}O_2$ they designated Chaulmoogric Acid. It had melting point 68° C. This is no doubt perfectly correct and we readily accord. They state "Palmitic Acid was also identified." It need hardly be added that the glyceride of Palmitic Acid (Tripalmitin) occurs in practically *all* solid plant (and animal) fats along with the glycerides of Stearic Acid and Oleic Acid. Its presence can therefore be "identified" in Palm Oil!

Hence it follows that the presence of palmitic acid in genuine Chaulmoogric Acid of commerce or its salts is as natural as its presence in ordinary domestic *soap* and it is incorrect to term any sodium chaulmoograte "impure" on account of its containing Palmitate.

An *accurate* determination of the amount of Chaulmoogric Acid in genuine Chaulmoogric Acid of commerce is almost impossible as the acids whether homologous or not have very closely allied behaviour in fractionation.

Sir L. Rogers (L. i./16,288, 374) is inclined to attribute pain produced on injection of Sodium Chaulmoograte of commerce to the presence of Palmitic Acid as impurity. We conducted a large amount of investigation to determine to what extent Palmitic Acid could be eliminated.

For hypodermic use, clearly a readily soluble preparation is required. This property would certainly not be held by true Sodium Chaulmoograte.

It would appear that the process of "purification" referred to (*loc. cit.*) provided this authority with the sodium salts of a mixture of the *lower* members (and lower melting) of the component series of fatty acids which as sodium salts are readily soluble.

As an outcome of all this work we have fractionated the acids of genuine Chaulmoogra Oil into two groups as stated (after examining the chemical properties and proportions of *four* groups) and advise their use as sodium salts as follows:—

Sodium Chaulmoograte "A" *Martindale* comprises the salts of the higher acids with relatively high melting points. This compound salt would contain the true Chaulmoograte and Palmitate and homologues the acids of which have combined melting point of 50° C. approximately. It represents 50–75% of the total.

Sodium Chaulmoograte "C" (*free from Palmitate—Martindale*), comprising the lower acids with relatively low melting points It contains the lower homologues with combined melting point of 25° C. approximately.

It is suggested that whilst the "A" salt is not soluble in a proportion to permit of the ready administration of 3 or 4 grain doses it would be nevertheless suitable for administration in pill form. Simultaneously the "C" chaulmoograte which is readily soluble should be tried by hypodermic injection. In this way the total active constituents of commercial Chaulmoogric Acid could be utilised. On the other hand by giving "A" or "C" alone much may be learnt of their relative activities.

Sodium Chaulmoograte "A" *Palmitate Free* is also prepared but its refinement is expensive and in view of the above suggestions relatively unnecessary.

So far as we are aware no pharmacologist has been able to point to the real therapeutically active constituents of Chaulmoogra Oil and it is possible that a fractionation on these lines may enable us to separate the useful from the inert components. (*c.f.*, Theory of Action, p. 588).

Sodium Chaulmoograte "A" Pills and Gelatin Capsules, 1, 2 and 3 grains (**0·06, 0·12 and 0·2 Gm.**). are prepared.

Dose.—One thrice daily after meals or *ad lib.*

Sodium Chaulmoograte "A" Suppositories, 1, 3 and 5 grains (**0·06, 0·2 and 0·3 Gm.**) or more are also made.

Sodium Chaulmoograte "C" Hypodermic Sterules, 1, 2 and 3 grains (**0·06, 0·12 and 0·2 Gm.**).

Dose.—An injection may be given deeply *under* the fat layers—this is stated to reduce reaction—once or twice a week or as found to be tolerated. *Note.*—Warm the Sterule slightly in a little hot water and shake to thoroughly emulsify.

We have had *no* adverse reports on the injection of Sodium Chaulmoograte "C." *c.f.* Physiological Expts. *infra.*

The Superintendent of a Leper Asylum informs us privately that the Injection 'C' is much less painful in use than the Chaulmoogra Oil and Camphor Mixture.

References.

Sodium and Potassium Chaulmoogrates dissolved in water with addition of ½% Phenol. 1 to 2 grain doses have been given twice a week subcutaneously also Chaulmoogric Acid internally up to 40 grains daily. Anæsthetic cases showed marked diminution of the anæsthesia and return of heat and cold and tactile sensations as well as some gain in muscular power within 2 months. Tubercular leprosy also improved.—Sir L. Rogers, L. i./16,288,374.

Sir L. Rogers working subsequently has separated the total acids of Chaulmoogra Oil on lines almost identical with our own, and has communicated a paper on the subject. He expresses the opinion that it is very doubtful if the Chaulmoogric and Palmitic Acid fraction is of any value when given internally. The remaining acids which in his case have melting points 37 to 40° C. give soluble Sodium Salts. These combined Sodium Salts have been given *intravenously* in 2 to 3% solution with promising results—possibly of value also in tuberculosis. The intravenous method is preferred to the subcutaneous. He states that the most striking result is the occurrence of definite local reactions in the diseased tissue—sometimes accompanied by fever which has been seen in several cases after from 2/5 to 3/5 grain intravenously.—B.M.J. ii./16,550.

Physiological Experiments with our Fractions.

We have had the following physiological experiments specially conducted :—

Determination of Toxicity of Sodium Chaulmoograte "C" and comparison of a 2% with a 20% Sodium Chaulmoograte "C" Solution.

Sir L. Rogers it will be noted uses a 2% solution of his soluble fraction and in relatively minute dose. Our preparation we had good reason to believe is better tolerated and the following summarised report justified the view.

Injections were given, isotonised :—

(1) Intravenously without anæsthetic—Rabbits.
(2) ,, under ether—Cats.
(3) Subcutaneously without anæsthetic—Cats.

(1). **Intravenously** using the 20% preparation a rabbit tolerated 0·1 Gm. of Sodium Chaulmoograte "C" per kilo body weight = 6·3 Gm. for a 10 stone man.

Using the 2% preparation a rabbit suffered marked dyspnœa and tremor from 3·15 Gm. calculated for a man, but recovered. A dose in this strength equal to 7·5 *G*m. for man, killed the animal in 5 minutes.

(2) **Intravenously** with the 20% preparation a cat survived (with fall of blood pressure and dyspnœa) 0·1 Gm. per kilo body weight = 6·3 Gm. for a man, whilst 0·184 Gm. produced immediate death. (Combined 2 and 20% preparations given separately).

(3) **Subcutaneously** with the 20% preparation 0·15 Gm. had no obvious effect on a cat = 9·5 Gm. for man and with even twice this amount there was only temporary dyspnœa and loss of appetite with recovery.

Conclusion.

As the doses used by Rogers.—B.M.J. ii./16,550—seemed so small and we ourselves have knowledge of 3 grains of our "C" fraction being given hypodermically in treatment over lengthy periods the above results were particularly gratifying—especially as the success of the treatment probably depends on saturating the system with the active Chaulmoogra components.

It is clear from the physiological report that weight for weight—comparing the results on animals with the dosage for man—three grains of our *"C" Fraction* ought *certainly to be tolerated* in either 2 or 20% solution even intravenously but the subcutaneous method would seem preferable.

(*Inferences from comparing doses for animals and man by weight for weight should of course be guarded.*)

Sulphuric Acid Test on "A" and "C" Fractions.

Both 'A' and 'C' Acid fractions give the recognised green colour with Sulphuric Acid common to Chaulmoogra Oil. It is preferable to have the fats in *excess* of the Sulphuric Acid. The 'A' responds with stirring in a minute or two. The 'C' gives it in almost the same time but is not so marked.

Unna's Chaulmoograte Pill.

Contained Sodium Chaulmoograte, Ginger and an aperient.

Magnesii Chaulmoogras. Phineas Abraham employed this compound in leprosy.—B.M.J. ii./92,1111,1198.

OLEUM MORRHUÆ.

Syn. **Oleum Jecoris Aselli.**

French—*Huile de Foie de Morue.* German—*Lebertran.*

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

The oil (*Off.*) is separated from the livers of codfish, *Gadus Morrhua* (*Teleostei*), by means of steam at a temperature not exceeding 85° C. It is then cooled to a temperature of about—5° C. and the liquid portion, producing the "non-freezing" oil of commerce, is pressed through canvas. Inferior brands are prepared by heating.

For further detail of Characters and Test, see Vol. II.

Soluble.—1 in 2 of Ether, slightly in Absolute Alcohol.

Flavoring.—Syl Lavandulæ, Glyl Pini, or as Emulsion.

The following mixtures of essential oils have been suggested for the purpose: Oleum Amygdalæ Essentiale 2½, Oleum Cinnamomi 7½, Oleum Limonis 16. Further, Oleum Amygdalæ Essentiale 4, Oleum Gaultheriæ 2½, Oleum Cinnamomi 6½, Oleum Myristicæ 2½, Chloroform 5½.—P.J. ii./09,758.

To cover the taste may be taken with a little salt, Worcester Sauce, in steel or orange wine, coffee or milk.

Uses.—Nutritive, nervine tonic given in rickets, phthisis, chronic bronchitis, general debility and malnutrition.

In tuberculosis the **value of Cod Liver Oil** appears to depend on the scientific facts that the liver has the power of decomposing fats and yielding to the blood 'unsaturated' fatty acids. These have chemically a loose double linkage and are capable of exerting chemical action more markedly. Fish, particularly Cod Liver, and vegetable oils are richer in these constituents than animal oils. The effects of

Cod Liver Oil on the acid-fast properties of the tubercle bacillus showed that the oil had attacked the waxy coating of the bacillus and rendered it, after several months, non-stainable by usual methods. ‘ An increase in the amount of unsaturated fatty acids in the environment of the bacillus tends to disintegrate it.’ It is assumed, from analogy with animal experiments, that an increase of unsaturated fatty foods yields an increase of the same in the blood, and that the tubercle bacillus is present in the blood in comparatively early cases of phthisis. Increase of saturated fat above a certain point retards its absorption from the intestine. The saturated fat is assimilated up to about 14% only. Unsaturated, on the other hand, are absorbed to extent of 98%. In mixed diet the unsaturated help the saturated to become absorbed. Two cases showed that on increasing the proportion of unsaturated fat there was an equal increase of absorption of fat.—B.M.J. ii./09,1120 (see also B.M.J. i./11,126).

95 to 98% of the Oil consists of Fatty Acid compounds, the other bodies (51 have been found at different times) are not the active principles—some may be decomposition products and some are hypothetical.

The highly **Unsaturated Acids** contained serve the immediate *needs of energy* production and the *saturated* are stored in the nature of a reserve. Cod Liver Oil is composed almost entirely of unsaturated fats.

It may be well to remind non-chemical readers that the saturated fatty acids are those in which all the valencies of the Carbon atom are fully satisfied, as, for example, in Acetic Acid—the first of the series containing Palmitic and Stearic Acids. The **Unsaturated Acids** have some of the Carbon Valencies unattached to other elements and hence have double bonds, thus $C=C$, *e.g.*, Acrylic Acid—the first of the series containing Oleic Acid.

The Oil should be prepared under conditions preventing oxidation. These have the higher amount of saturated fatty acid compounds,—to which the therapeutic effects can be attributed. They have further the least taste.

Cod Liver Oil is a food—*it enters into permanent combination with a body cell* yielding energy to it and altering the whole of the cell’s relations by becoming an integral part of the cell protoplasm. It is more readily absorbed than other fats and has probably a marked action on metabolism.

The greater part of the fat obtained from animal tissues is not real fat, but to a great extent complex combinations of fatty acids with Glycerophosphoric Acid and Nitrogen-containing compounds —the so-called **Phosphatides**—this is the portion actually made use of by living cells. These phosphatides probably represent a necessary step in the elaboration of fatty substances destined ultimately to undergo actual assimilation into living matter. Ordinary fat undergoes a change into phosphatide and probably in these bodies the desaturation of the fatty radical is brought about. In view of the close relationship between the fats and Nitrogen in the phosphatides of the cell, it is possible that the introduction of unsaturated fatty Acids into the body may, in some way, alter nitrogenous metabolism. Phthisical patients treated with Cod

Liver Oil have been carefully observed and effects on *Nitrogen metabolism* found to be marked and the beneficial effect on *fat absorption* was also considerable.—O. T. Williams, P.J. ii./12,806; L. ii./12,1844. (This paper is an exceedingly valuable one and will repay careful study.)

Cod Liver Oil is normally digested and absorbed before it reaches the lower bowel, hence it is not a laxative.—E. Pritchard, B.M.J., i./15,489.

Accessory Food Factor.—This and other Fish Oils are rich in 'Fat-soluble A' Vitamine—*c.f.*, Vitamines.

In trypanosomiasis has been reported on (in conjunction with organic arsenic) favourably. Should be tried in a large number of cases.—Bagshawe, L. ii./09,1197.

Dry condition of pharyngeal mucous membrane sometimes seen in weak anæmic women, with no other cause than general ill-health, treated with Cod Liver Oil and Iron, with change of air.—B.M.J. ii./09,197.

To allay skin irritation Cod Liver Oil 2 mixed with Huile de Cade 1 has been ordered to be applied with a shaving brush.—Ph. Notes.

One of the benefits of Cod Liver Oil in rickets is due to its forming a soluble soap with calcium.—B.M.J. i./11,500. (Latterly the vitaminc content theory has support).

When a patient is for any reason on a '+ Lime' diet Cod Liver Oil should be given.—*c.f. Digestive Tract*, p. 250.

Capsules of Cod Liver Oil 19 minims **and Creosote** 1 minim are for use in phthisis, also made plain 20 and 30 minims.

Capsules of Cod Liver Oil (½ drachm) with **Blaud Pill** (4 grains).—Ingredients, Sodium Carbonate and Ferrous Sulphate 2 grains each. A satisfactory method of giving ferrous carbonate in *statu nascendi.*

Emulsio Olei Morrhuæ (50%). (**Martindale**).

Dose.—2 to 8 drachms (7 to 30 Cc.).

Soak Irish Moss 2 drachms in Water 12 ounces, six hours, boil and strain off 10 ounces. Allow to cool and add in three portions Cod Liver Oil 12 ounces. Then add Simple Tincture of Benzoin 1 ounce, Alcohol 90% 1 ounce, Essential Oil of Bitter Almonds 10 minims, Elixir of Saccharin 10 minims. This produces a good white preparation.

Ferrated Emulsion of Cod Liver Oil consists of the plain Emulsion with Citrate of Iron and Ammonium 5 grains per ounce.

Emulsion of Cod Liver Oil with Glycerophosphates, *v.* p. 46.

Emulsio Olei Morrhuæ et Hypophosphitum.

Dose.—2 to 8 drachms (7 to 30 Cc.). Contains the Hypophosphites of Sodium and Calcium, of each 1%, in the form for **Emulsio Olei Morrhuæ** *antea.*

We find this to be a permanent Emulsion which does not separate. Gum Acacia produced a white Emulsion, but not so permanent.

Emulsio Olei Morrhuæ cum Lecithin is the above with 5 grains of Lecithin per ounce. *Dose.*—2 to 8 drachms (7 to 30 Cc.).

The Lecithin is to be incorporated with the above finished Emulsion. Pharmaceutically it makes a very elegant and palatable preparation.

Note.—We found that five grains of Lecithin will only emulsify about ½ drachm of Oil in a formula of this description so that there is insufficient to do this without the aid of Irish Moss.

Emulsio Olei Morrhuæ et Iodoformi.

Consists of the plain Emulsion with ¼ grain of Iodoform added to the dose, *t.d.s.* Had apparently been of benefit in tuberculous affections in children.—B.M.J. ii./11,477.

Oleum Morrhuæ Aromaticum.

Dose.—1 to 4 drachms.

Coumarin 0·01, Saccharin 0·5, Vanillin 0·6, Absolute Alcohol 10·0, Lemon Oil 20·0, Peppermint Oil 3·0, Cod Liver Oil to 1,000. The taste is covered but the odour persists to some extent.

Gaduol.—*Dose.*—1 to 4 drachms (**4 to 15 Cc.**). An extract containing the alcohol-soluble principles of Cod Liver Oil.

✱**Hepol** (T.M. 363632) Capsules 30 and 60 minims. *Dose* one or two thrice daily after meals.

A compound of Cod Liver Oil with the alkaloidal extractives of Cod's Liver Tissue. These have high Nitrogen content and exert a stimulating action on metabolism.

Sodium Morrhuate—the sodium salts of the unsaturated fatty acids of Cod Liver Oil after extraction by ether—a 3% solution sterilised with ½% Phenol added.

Dose.—Subcutaneously ½ Cc. slightly increased up to 2 Cc. 2 or 3 times a week until reaction (febrile and local) occurs. When 2 Cc. has been reached give this dose *intravenously* up to 4 Cc.

The theory is that the sodium salts of the unsaturated fatty acids of this and chaulmoogra oil act in some way on the coating of the acid-fast bacilli that of tuberculosis having been shown to contain palmitic and other unsaturated fatty acids.—Sir L. Rogers, B.M.J. i./19,147.

Cod Liver Oil Substitutes. *See* **Maltolivine**, ✱**Marrubin** (T.M. 261511, (✱**Favimol** (T.M. 362836), **Mistura Olei Olivæ, Syrupus Tann-Iodo-Phosphoratus.**

Dugong Oil from two species of halicore, sebaceous animals inhabiting the rivers and bays of N. and E. Australia may have some value.—B.M J. ii./07,1528.

G. Watkins, Brisbane, writes he has seen it used externally many times on persons suffering from wasting disease with most beneficial results. Properly prepared it is far superior to Cod Liver Oil. There is, however, a great limit in the production. The calf is three or four years in reaching maturity—only one is produced per year.—C.D. i./13,886

Mutton Bird Oil as a substitute for Cod Liver Oil—the oil of the young Sooty Petrel collected on the Stewart Island south of New Zealand advocated for feeding in phthisis and bronchitis.—J. S. Purdy, B.M.J. i./18,174.

OLEUM OLIVÆ.

Dose.—½ to 1 ounce (**8 to 30 Cc.**).

The oil expressed from the ripe fruit of *Olea europæa* (*Oleaceæ*).

Inferior brands are obtained by addition of the pulped fruit to boiling water and by fermentation processes. *For detail of Tests see Vol. II.*

Uses.—Olive Oil is a nutrient and has laxative properties (*vide infra*). Often gives relief to patients who have gall stones. It is frequently used warmed to about 90° F. as rectal injection, as much as 10 ounces at bedtime for constipation. In typhoid ½ ounce doses *per os*, and a breakfast-cupful by the bowel daily gives great relief.

Capsules (Gelatin) of Olive Oil, each containing ½ drachm.

These capsules are also prepared **Formalised** (**Formagules**) for lubricating the intestines in cases of habitual constipation.

Olive Oil in ½ to 2 ounce doses has been recommended for the treatment of gastric ulcer given by stomach tube if necessary. It is said to inhibit the secretion of hydrochloric acid. Hyperchlorhydria is generally associated with gastric ulcer.—H.

For chronic constipation also gastric ulcer, fissures, hyperacidity and pyloric spasm. Greatly superior to Silver Nitrate or Bismuth and Belladonna. Can be given for long periods and is harmless.—Med. Press, 1917, 154, p. 221 P.J. i./17,275.

Enema Oleosum L.H.

Olive Oil 4, Soft Soap 1, Warm Water 16.

Emulsio Olei Olivæ. *Dose.*—1 to 2 ounces.

Olive Oil 1 ounce, Gum Acacia Powder 25 grains, Simple Syrup ½ ounce, Water to 4 ounces.

Oleum Olivæ depuratum atque sterilisatum.—Fr. Cx. Wash Olive Oil 100 with Alcohol 95% 30 in a bottle, shaking occasionally; separate the Alcohol and repeat. Then heat the oil for 10 minutes on a sand bath at a temperature not exceeding 115°. Preserve in 50 Cc. sterile bottles.

Maltolivine.

Dose.—2 to 4 drachms (7 to 14 Cc.).

A combination of Olive Oil and Malt Extract, as a substitute for Cod Liver Oil. It is palatable and of considerable value as a nutrient in marasmus, rickets, and emaciated and wasting conditions and in colitis of children.

OLEUM PAPAVERIS.

Suggested use of other Oils to replace Cod Liver Oil in malnutrition, phthisis and other forms of wasting disease.

It is acknowledged that Cod Liver Oil probably owes its utility to the fact that it contains a large proportion of Glycerides of **Unsaturated Fatty Acids.** Many workers have engaged themselves with the chemistry of Cod Liver Oil. The standard work on the subject is Moller's Cod Liver Oil and Chemistry, published in 1895. The late O. T. Williams, with the assistance of G.E.K. Branch, contributed a useful paper on the subject, which we have summarised on p. 593. As evidence of the extraordinary different behaviour of fats in the organism, we may add these workers stated that of *Olive Oil only* 2% *is not absorbed,* whilst with saturated fats, *e.g.*, Stearin, 86 *to* 91% *is not absorbed.* This difference may be accounted for, however, to a certain extent on the basis of melting point of the fat, but there is no doubt that unsaturated fats are more easily absorbed than saturated.

The disadvantages to Cod Liver Oil are its taste and tendency to become rancid.

On the content of unsaturated bodies depends the Iodine No. (*c.f. Vol. II.*). In reviewing the Iodine Numbers there given for various available oils, it is evident that several nutritive oils, *e.g.*, Poppy Seed Oil, Maize Oil, Soya Bean and Sunflower Seed Oil, which rank almost as high as Cod Liver Oil in Iodine values, suggest themselves as suitable for therapeutic use. These Oils are used both medicinally and as foods, *c.f.* **Maize Oil and Soya Bean.**

We found the Iodine Numbers to be as follows :—

Cod Liver Oil	126–166	Sunflower Seed ..	136·1
Poppy Seed Oil ..	138·1	Soya Bean	122
Maize Oil	111		

From these we singled out Poppy Seed Oil as being the most suitable for our purpose (Linseed Oil Unboiled, has a high Iodine No., but its taste is far too objectionable).

We understand that this Oil is sold largely as Salad Oil*, but frequently Arachis Oil may be purveyed under the same designation, it depends which is the cheaper of the two at the time. Poppy Seed Oil comes from Russia and France—that from France is usually the best brand. It frequently gives reaction for Sesame Oil. This is not due so much to deliberate adulteration as to chance contamination in the pressing. Its presence can be detected in Poppy Seed Oil with a little Hydrochloric Acid and Sugar as in the case of Olive Oil *q.v.*

Poppy Seed Oil has never been known to have any toxic action and has been used for years for the table in this way.

We took occasion to carefully examine the Oil for the presence of narcotic and alkaloidal constituents without finding same. For use as a food and medicine its genuineness and general purity should be determined prior to use.

Note.—Henbane Seed Oil is free from alkaloids, hence cannot contaminate Poppy Seed Oil with Hyoscyamus alkaloids in presses.—Y.B.P., 1913, 102.

Oleum Papaveris.—Poppy Seed Oil.

Dose.—¼ to ½ ounce or *ad libitum.*

Genuine Poppy Seed Oil has Sp. Gr. 0·924—0·927, Iodine No. 132·6 to 143·3. It is odourless and almost tasteless,—indeed palatable. It is of light yellow colour and is in every way suitable for use both as a food and a medicine. It is contained to the extent of 50% in the seeds. Chemically it consists essentially of the Glyceride of Linoleic Acid.

Preparations of Poppy Seed Oil.

(T.M. 362836) **✱Pavimol.** *Syn.* **Emulsio Olei Papaveris.**

Dose.—½ to 1 ounce twice or thrice daily, increased if well tolerated.

An emulsion containing 50% of pure Poppy Seed Oil with flavouring agents.

Uses.—As a substitute for Cod Liver Oil in malnutrition. The Oil, as already explained, is reactive by reason of its large proportion of unsaturated bodies.

Dr. Vaughan Bateson, of Bradford, kindly undertook therapeutic trials for us with this Emulsion. A weakly child of six years of age (H.H.), weighing 2 stones 11 lbs., increased her weight 7 lbs. in six weeks whilst under treatment with Pavimol. She improved in health. No other constitutional drugs were used.

Note.—A child between six and seven years, according to generally accepted rules, should weigh between 3 st. 2½ lbs., to 3 st. 7¾ lbs. This means an increase of 4¼ lbs. in 12 months or approximately *½ lb. in six weeks.* A second child of five took 2 drachms doses *t.i.d.* and also improved much and gained weight.

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* Since by far the greatest part of expressed Poppy Seed Oil is used as a table oil, all edible Poppy Seed Oils are termed 'huile d'œllette.'—Thorpe Vol. IV., 1913, p. 334. **It is used as an adulterant for Olive Oil.—Allen.**

Appendicitis.—It is of interest that the late O. T. Williams, after an extensive enquiry, found an increasing incidence of appendicitis in countries where much saturated fat is consumed (and *vice versa*).—L. ii./14,227.

Pavimol Capsules.—Contain 15 minims (1 Cc.).
Dose.—2 to 4 twice or thrice daily. More may be taken if tolerated.

Pavimol Powder.—Pulvis Olei Papaveris. 33% strength.
Dose.—1 to 2 drachms (4 to 8 Gm.). For those who cannot take oil this may be useful. It is flavoured with Saccharin.

Pavimol with Malt.—Contains 25% Poppy Seed Oil.
Dose.—2 drachms to 1 ounce thrice daily.

Pavimol Tablets contain 5 minims (0·3 Gm.).
Dose.—4 to 8.

For Rickets Emulsion of Cotton Seed Oil with Oleic Acid as good as Cod Liver Oil.—B.M.J. i./07,20

OLEUM RICINI.

Dose.—1 to 8 drachms (4 to 30 Cc.).

Expressed from seeds of *Ricinus Communis* (*Euphorbiaceæ*). ***Soluble*** about 1 in 4 or less of Alcohol 90%. Also soluble in ether and glacial acetic acid. Sp. Gr. 0·958 to 0·970. (*Off.*) Saponification No. 180, Iodine No. 84. The seeds, but not the oil, contain the poisonous protein Ricin;* the 'press cake' therefore is poisonous. The purgative action is due to the fatty acids, of which ricinoleic is a principal member.

Total acidity (as oleic acid) should not exceed 1%.

Deposition in the Cold Weather is often a great annoyance to the pharmacist. The difficulty can be met by specifying finest quality *Pharmaceutical* Oil as distinct from Soapmakers' and other industrial oil.

Flavoring.—Prescribed as Oleum Ricini Aromaticum, or with 2 drachms of Tinctura Cardamomi Composita to the ounce, or in capsules, or as 'Maricol.'

Uses.—A mild but effectual purgative rarely causing pain. It is rendered more efficacious when mixed with an equal quantity of Glycerin. The oil rubbed on the breasts will often increase the flow of milk. Castor oil is a soothing application to the conjunctiva, and is employed for making solutions of the alkaloidal bases (*q.v.*).

In sprue 1½ drachms every morning.—Cantlie, B.M.J. ii./05,1281.

It increases peristalsis of the stomach and small intestine, but has little effect upon the large intestine.—M.A. 1910, p. 19.

Capsules of Castor Oil contain ½ or 1 drachm.

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* Ricin.—A vegetable toxin or toxalbumin is tremendously potent. When small doses are injected hypodermically immunity is produced, antiricin being formed. This fact paved the way for the foundation of serum therapeutics.—P.J. i./15,156.

Capsules of Castor Oil, Compound, contain Croton Oil ¼ minim, with Castor Oil 8 minims. *Dose.*—One or two.

Enema Olei Ricini.—Castor Oil 1, Olive Oil 4. *Dose.*—5 to 10 ounces.

Oleum Ricini Aromaticum. *Dose.*—1 to 8 drachms.

Vanillin 1 grain, Peppermint Oil 10 minims, Saccharin 4 grains, Absolute Alcohol 60 minims, Tincture of Alkanet 1 in 5 Alcohol (90%) 10 minims, Castor Oil 4 ounces. The taste is covered : for children.

Castor Oil Solutions of Alkaloids.

Uses.—Instillation of Castor Oil to the eye allays the irritation caused there by foreign bodies. The alkaloidal bases (not their salts) dissolved in Castor Oil are used in ophthalmic work. They keep well. A $\boxed{P1}$2% solution of the combined bases Homatropine and Cocaine have been of great service (*q.v.*). Solutions 1% respectively of $\boxed{P1}$Atropine, Cocaine ($\boxed{P1}$4% will dissolve), ⓅGelseminine, ⓅHomatropine, $\boxed{P1}$Hyoscine, $\boxed{P1}$Hyoscyamine, and ⓅPilocarpine have also been used. Physostigmine (Eserine) is used in Ⓟ½% solution. R.O.H. has Ⓟ1% with Cocaine 2%. Morphine is barely soluble in it to the extent of Ⓟ½%. *In making these avoid excessive heating.* 2% each of Homatropine and Cocaine the most efficient cycloplegic. —N. Bishop Harman, B.M.J. i./20,599.

Sodii Sulphoricinas. *Syn.* TURKEY RED OIL.

$C_{17}H_{32}O.SO_3H.COONa=400{\cdot}414.$

Prepared by the action in the cold (not exceeding 50° C.) of sulphuric acid 1, on castor oil 3 (sulphurous acid must not be evolved), washing with plenty of water and nearly neutralising the product with soda. It is used in the form of suppository as a purgative.

Concentrated solution of Sodium Sulphoricinate will dissolve iodine, resorcinol and naphthalene, forming strongly antiseptic solutions.

It was employed as a Glycerin Substitute in the war *e.g.* in hair preparations.

Ⓟ**Phenol Sodio-Sulphoricinate.** A mixture of phenol 1, and sodium sulphoricinate 4, is a yellowish brown thick syrup miscible with water. Used in 20 to 50% solution for papilloma and tuberculosis of larynx and ozœna.—P.J. ii./00,305 ; B.M.J. ii./04,1225.

Pharyngo-keratosis (mycosis) has been treated with 10% solution, also 10% solution of Salicylic Acid in the sulphoricinate.

Magnesii Ricinoleas. *Syn.* '**Maricol.**'

Dose.—1 to 4 drachms (**4 to 15 Gm.**).

A white powder, employed in several proprietary preparations known as 'Castor Oil Powders.' Some Castor Oil Pills, however, contain Calomel without Oil.

As much as 50% of Castor Oil can be incorporated in this way, but extraction with Ether in a Soxhlet demonstrates that the mixture is by no means a soap. 96 to 98% can be recovered. A small part of the Alkali is saponified by the free fatty acids in the oil, which then emulsifies the rest of the oil.—Otto May.—J.S.C.I. per P.J. ii./09,296.

Iodicin (T.M. 376644). *Syn.* **Calcium Iodo-ricinoleate.**—As an innocuous mode of giving Iodine without upsetting digestion, being absorbed from the bowel. **Capsules** 3 grains.—B.M.J. i./08,936. In syphilis and ulcerated wounds used with advantage.

OLEUM ROSÆ.

Syn. **Otto or Attar of Rose.**

Distilled from the fresh flowers of *Rosa damascena* (3,000 yield 1). *For Characters and Tests, see Vol. II.*

Rosettol.—An artificial Otto with distinct odour of roses, probably more penetrating than the natural oil. It is entirely free from Stearoptene, *i.e.*, is fluid at ordinary temperatures.

Liquor Rosæ Dulcis. (Ph. Form.).

Otto of Rose 8 drops, Carmine 2 drachms, Potash Solution ½ ounce, Glycerin 1 ounce, Alcohol 90% ½ ounce, Syrup to 10 ounces. Useful for scenting and colouring pharmaceutical and toilet preparations.

Pulvis Rosæ Compositus. *Dose.*—Ad libitum.

Oil of Rose and Chloroform of each 1 (or combined 4 drops), Acacia 145 (grains), Sugar 840 (grains), Solution of Carmine 13 (drops). Useful to dilute powders such as Calomel, Grey Powder and Jalapin, also to colour and flavour mixtures—¼ or ½ ounce in 6 ounces.

Unguentum Aquæ Rosæ (*Off.* and B.P. 1898).—*Syn.* CERATUM GALENI; UNGUENTUM GALENI; COLD CREAM.

E. W. Lucas finds it best to omit Spermaceti from this Ointment. His form is :—

White Beeswax 18, Almond Oil 61, Borax 1, Rose Water 20, Otto of Rose 0·1.—B.M.J. ii./13,1013. This has been adopted *Off.*

Cold Cream Substitute.—

Antipyrin 188, Resorcin 110 and Terpene 180 are heated together in an oil bath to 125° C., an oily combination being obtained, Glycerin 1000 is added. This preparation is stated to be antiseptic hæmostatic, and not irritating.—Pr. Nov. 10, p. 729.

It forms a white paste of minute crystals.

OLEUM SANTALI.—In numerous Pharmacopœias.

With data as to Copaiba and Cubebs.

Dose.—5 to 30 minims (0·3 to 2 Cc.).

Santal or Sandal Wood Oil is distilled by steam under pressure from the wood of *Santalum album* (*Santalaceæ*), the yield being from 1 to 6%. A yellowish oil, with an aromatic odour and pungent taste. Consists to extent of 90% of the Alcohol Santalol. (Some Pharmacopœias specify less). Sp. Gr. 0·973 to 0·985 (*Off.*).

It is now generally held that *Santalum album*, is a root-parasite, and that in the absence of suitable host plants it fails to succeed. For a summary of information available regarding the growth of sandal, and descriptive list of the plants on whose roots the haustoria of the sandalwood-tree have been found, *vide* "Indian Forests Records" (1911, 2. Pt. IV.)

For further Characters and Tests of the Oil and Notes on its Manufacture, see Vol. II.

Soluble in all proportions in alcohol 90%. Readily in ether and chloroform.

Flavoring.—Best given as Capsule.

Uses.—Internally in chronic bronchitis, *e.g.*, a few drops taken on a lump of sugar is found to relieve cough without expectoration. Is much employed in the treatment of gonorrhœa and gleet. It quickly checks the discharge in dose of 15 minims 3 times a day, and with the use of permanganate, zinc and silver nitrate injections give good results; also in 10 minim capsules, for chronic cystitis, with benzoic and boric acids, as adjuvants.

Copaiba Oil, Cubebs and Sandal are feeble in action on putrefactive organisms, or *Bacillus Coli,* but against *Staphylococci* they are powerfully antiseptic.—P.J. ii./11,17.

Santalol. *Syn.* ✱**Arhéol.** (T.M. 266332).
$C_{15}H_{24}O=220·267$.

Dose.—3 minims (**0·2 Cc.**) 6 to 12 times a day. The use of Santalol as distinct from its parent substance the oil has been recently advocated. Even in large doses there is no disturbing influence on the stomach or kidneys in gonorrhœa, cystitis, vesical and bronchial catarrh.

Santalol Capsules contain 5 minims (0·3 Cc.).

Santalol Formagules, 5 minims (*c.f.* Formagules) are also prepared.

Santalol Tablets contain 3 minims of Santalol. *Dose.*—One tablet 6 to 12 times a day. These are preferred to the Capsules by some patients, but must be swallowed whole otherwise the taste is too unpleasant

Santalol-Methyl-Salicyl Capsules contain 4 minims (0·24 Cc.) with 1 minim (0·06 Cc.) Methyl Salicylate. This combination has been found very useful in gonorrhœa.—*Campbell Williams.*

Salicyl Santalol. *Syn.* ✱**Santyl** (T.M. 275172).
$C_{15}H_{23}C_6H_4.OH.COO=340·334$.

Dose.—15 to 30 minims (**1 to 2 Cc.**).

Manufacture.—According to the Patent Specification 17511/1905, since revoked, Sandal Wood Oil or pure Santalol is heated with the same quantity of Salol with the addition of a little Caustic Soda at a temperature of "100 to 200° C" if possible under reduced pressure until the separation of the Phenol is effected.

This may or may not prove satisfactory. We should doubt whether the desired dissociation and ester formation would take place. It would seem preferable to try a distillation of a mixture of equivalent quantities of Salicylic Acid and Santalol (possibly Sandal Wood Oil) with strong Sulphuric Acid or to pass dry Hydrochloric Acid into a mixture of equivalent quantities of Salicylic Acid and Santalol or to heat Sodium Salicylate and Sodium-Santalo with Phosphorus Oxychloride.

Yellow Oil with balsamic odour free from acrid taste. Stated not to irritate the stomach or kidneys; given for urethritis and cystitis.

Agonal is chemically Santalol Benzoate.—L. i./14,184.

Capsules of Santal Oil are prepared, containing 5, 10, 15 and 20 minims in each. **Gonal Capsules** are similar.

✱ **Savaresse's** (T.M. 11416) **Capsules** contain 10 minims, and are prepared with an animal membrane, and it is claimed are less nauseating as they generally remain entire until they have passed the stomach. The patent described.—P.J. i./07,538.

Capsules of Santal Oil 5 and 10 minims **with Methylene Blue** ½, 1 and 2 grains are prepared.

Capsules of Copaiba contain 5, 10, and 15 minims; capsules of **Copaiba and Santal Oil** of each 5 minims; also **Oil of Cubebs**

and Santal Oil of each 5 minims; also **Copaiba and Cubeb Oil** of each 10 minims, and of each 5 minims.

Copaiba, the Oleo-Resin. *Syn.* BALSAMUM COPAIVÆ. In numerous Pharmacopœias.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Is obtained from the trunk of *Copaifera Lansdorfii* and other species (*Leguminosæ*), and is imported from the northern coast of South America.

Soluble almost completely 1 in 1 of Alcohol 90%, almost entirely in Absolute Alcohol, Ether, and in four times its volume of Petroleum Ether. That known as Para Copaiba is transparent, yellowish and thinner than the Maracaibo variety, which is brownish and somewhat fluorescent. Sp. Gr. about 0·975 to 0·995 (*Off.*).

Uses.—Diuretic and stimulant to mucous membranes, chiefly used for urethral diseases, and occasionally for chronic bronchitis. May produce a red rash. Given emulsified with mucilage or saponified, but best in Capsule. *See* also Liquor Copaibæ.

Oleum Copaibæ (*Off.*)

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**), is distilled from it and constitutes at least 45% of the oleo-resin. Sp. Gr. 896 to 0·910 Soluble in its own volume of Absolute Alcohol(distinguishes 'African'), about 1 in 20 Alcohol 90%; requires 5 to 10 volumes of 95% Alcohol to dissolve it.—Schimmel, Am. Jl. Ph., June '06,257.

Oil of Turpentine has also been used as adulterant—it is recognisable in a distillate.

1 Cc. of the oil dissolved in 5 Cc. of glacial acetic acid, and 4 drops of nitric acid added, should not develop more than a faint violent colouration (absence of gurjun oil).

Gonococcal arthritis treated by full doses of the oil, also by rubbing into the affected joints and fibrous tissue a mixture of Copaiba Oil 3, Olive Oil 1. —B.M.J. ii./11,1466.

Gonorrhœa treated by 15 minim doses at first thrice and then six times per diem with distinct effect on the discharge especially with the larger dosage —R. Stockman, B.M.J. ii./15,128.

Copaiba Resin is the residue left after distilling off the volatile oil from Copaiba.

R. Stockman proved (B.M.J. ii./15,128) that this resin is *practically inert* as a genito-urinary antiseptic. Doses of 15 to 30 grains were given in gonorrhœa thrice daily.

Mistura Olei Santali. *Dose.*—One ounce (**30 Cc.**).

Oil of Sandalwood 4, Tragacanth, in powder 1. Mix,and add quickly Water to 128. Shake well. Aromatic water with syrup may be used.

Mistura Santali Composita. *Syn.* NISBET'S SPECIFIC.

(This name may be used for a preparation of the following composition without rendering it liable to stamp duty providing this book and the page be mentioned on the label.)

Dose.—½ to 1 drachm in water or milk thrice daily.

Santal Oil 12½ drachms, Cassia Oil 1½ drachms, Pimento Oil 40 minim Alcohol (90%) 3½ ounces.

Capsules of Nisbet's Specific are prepared containing the Oils of ½ drachm dose of the above in 20-minim capsules.

Haustus Copaibæ, St. Bart's. H. Copaiba 15 minims, Solution of Potash 5 minims, Spirit of Nitrous Ether 15 minims, Mucilage of Gum Acacia 60 minims, Camphor Water to 1 ounce.

Liquor Copaibæ, Soluble Copaiba.

Dose.—½ to 1 drachm well diluted.

Copaiba 18, Solution of Potash 26. Boil for 15 minutes, dilute whilst hot with 10 of water, transfer to a bottle and set aside to clarify; then syphon off the clear liquor from the supernatant oily portion and the sediment. Make volume of same 36 with water.

Flavoring.—Glyl Lavandulæ, Glyl Pini; Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Mistura Copaibæ, St. M.'s H.

Copaiba 15 minims, Mucilage 1 drachm, Magnesium Sulphate ½ drachm, Cinnamon Water to 1 ounce.

Liquor Copaibæ cum Buchu et Cubeba.

Dose.—1 to 2 drachms (4 to 8 Cc.) well diluted.

Buchu in powder 5, Cubebs in powder 2, Alcohol (60%) *q.s.* Percolate and press to obtain 14. Mix 1 part with 2 of Soluble Copaiba.

Flavoring.—*See* Liquor Copaibæ.

Liquor Santali cum Buchu et Cubeba.

Dose.—1 to 2 drachms (4 to 8 Cc.) well diluted.

Yellow Santal Wood in powder 4, Buchu in powder 1, Cubebs in powder 1, Alcohol (60%) *q.s.* to moisten. Macerate 2 days and percolate with more alcohol and press to obtain 20.

Liquor Santali Compositus, *Martindale.*

Dose.—1 to 2 drachms (4 to 8 Cc.) diluted. Mix 2 volumes of Soluble Copaiba with 1 of the last preparation. A thick Liquor which can be almost cleared by adding 4% Potash Solution (1 in 2).

Liquor Santal cum Kava.

Dose.—1 to 2 drachms (4 to 8 Cc.) diluted.

Yellow Santal Wood in powder 4, Alcohol 60% *q.s.* to 15, Liquid Extract of Kava-kava 5. Is used in gonorrhœa, and is said to suppress the *ardor urinæ* and tendency to chordee, to increase the output of urine and to reduce pus.

Gelatin Capsules of Santal Oil and Kava Extract are prepared. *Dose.*—2 capsules 3 or 4 times a day.

✱**Blenosan** (T.M. 334680) is also a Santal and Kava preparation in Capsule form.

Kava-kava in these preparations is thought to act as an anaesthetic to the urethral mucous membrane, to reduce congestion and is at the same time an anaphrodisiac.

OLEUM SESAMI.

Sesame Oil.

Syn. **Benné Oil, Gingelli Oil, Teel Oil.** Expressed from *S. indicum* (*Pedaliaceæ*).

This Oil is official with Saponification No. 189-193, and Iodine No. 103 to 114. Three London Commercial samples examined by us gave 86·24, 96·85, and 109·81. It has Sp. Gr. at 15° C. 0·920–0·924. Solidifying point 4° C. Said to have advantage over Cottonseed and Olive Oil in that it does not readily turn rancid, is easily saponified even by cold process, is a semi-drying oil, neither gummy nor sticky, readily absorbed. Is thinner than Cotton Seed Oil.

Note.—This oil may be used instead of Olive Oil in various parts of the Empire. See B.P. It has been employed for making ophthalmic solutions of alkaloidal bases washed with half its volume of strong alcohol to free from fatty acids. The oil is separated and filtered if necessary. It is then sterilised at 120° C. for half an hour.

Emulsio Olei Sesami.

Sesame Oil 600 Gm., Water 300 Cc., Solution of Sodium Hydrate (Sp. Gr. 1·33) 6 Cc.

Dose per diem 2 to 3 ounces. Used by Prof. Arloing in the treatment of diabetes —Pr., June, 1911.

P1 OPIUM.

Syn. **Humbergum, Tabaiaco, Succus Papaveris Somniferi Capsulæ Inspissatus.**

(The latter or the contraction—**Succ. Papav. Inspiss.** *may be used in prescriptions to denote Opium where it is desired to refrain from using this name.)* **Pulv. Succ. Papav.** *will denote Powdered Opium.* (9·5 to 10·5% *Morphine.*)

P1 '*Opium and its preparations or admixtures containing* 0·75 *or more per cent. of morphine.*' (*By Order in Council, Feb. 9th,* 1916. *An amendment of the* 1908 *Act, which placed the limit at* 1%).

See also Cocaine and Opium Regulation, p. 949.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**).

Fr. Cx.—*Max. single dose* 3 grains ; max. during 24 hours 9 grains.

Antidotes.—*See* Morphine.

The inspissated juice obtained by incision of the capsules of *Papaver somniferum* (*Papaveraceæ*) from any geographical source. The Turkey product is best suited for pharmacy. Persian and Indian contain a large proportion of Narcotine.

Papaveris Capsulæ, Poppy Capsules. (B.P. '98).

Ⓟ "*Poppies, all preparations of, excepting red poppy petals and syrup o red poppies (Papaver rhœas).*"*

In the dried condition are used to prepare

Ⓟ **Decoctum Papaveris** 1 in 10. This is employed as fomentation in neuralgia, peri-dental abscesses and gum-boils.

Ⓟ **Decoctum Papaveris et Anthemidis.** Poppy Capsules 10, Chamomile Flowers 5, Water *q.s.*, boiled 10 minutes to produce 100. Employed as the last mentioned.

For galenical preparations, **Opium** *Off.*,and B.P 1898, must contain when dried and powdered, between 9·5% and 10·5% of anhydrous morphine. Opium Fr. Cx. must contain 10 to 11% on the drug dried at 60° C. F.I. requires 10% U.S. 10 to 10·5% Anhydrous Morphine; for the Tincture and Extract (*Off.*), may be used if containing when dry not less than 7·5%, these preparations being standardised when prepared.

For Assay Methods, See Vol. II.

P1 **Opium, U.S. VIII.** In its normal moist condition was to yield not less than 9% crystallised morphine (as in 1890). U.S. IX. requires not less than 9·5% Anhydrous Morphine.

It is difficult to understand why the U.S. specifies *P. Somniferum* and its variety *album* as it would be impossible to say whether either had been used. —E. M. Holmes, P.J. ii. 16,485.

Average Dose.—1½ grains (**0·1 Gm.**).

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* Fleurs de Coquelicot=Poppy Petals.

Incompatible with Vegetable Astringents, Alkaline Carbonates, Salts of Mercury, Iron, Lead and Zinc.

Uses.—The oldest and most certain remedy for pain, also tends to check inflammation and relieve nervous diseases ; lessens cough, arrests diarrhœa and dysentry (but is not advised for cholera). Externally the liniment is used for rheumatism, neuralgia and sciatica and is added to fomentations, and the ointment is applied to piles and fissures of the anus. Has some power in controlling the amount of sugar in diabetes. Children are very susceptible to its action.

It relieves the pain in appendicitis but must not be given for this, as, apart from the danger of the symptoms being masked, opium may paralyse the intestines and cause tympanites.—B.M.J. ii./07,63.

In cholera its use in any form is highly dangerous.—Brooke. Koch stated that even if a certain natural immunity exists against cholera it is immediately abolished directly the peristalsis is interfered with by Opium.

A great actress faced the ordeal of the first night by means of 7drops of Laudanum. John Hunter who disliked public speaking nerved himself for lecturing with 30 drops. The procedure may, however, bring about failure or lead to Opium habit.—B.M.J.i./09,1379 ; L.ii./08,439.

De Quincy took 9 ounces of Laudanum a day (*circa* 300 grains of Opium). Two cases are on record in which 16 ounces per diem were taken,—these lived to advanced age. ' Speech ' fright and stage fright are well treated by small doses of Opium just before the effort has to be made, *e.g.*, ¼ grain or 6 to 10 minims of Vinum Opii just before going into an examination, or a first appearance on the stage. Some advise a little Cannabis in addition.—B.M.J. i./09,1456.

Opium is stimulating to nerves, brain, &c., as well as being sedative, —in this respect it is stronger than Morphine. Stimulating effect, *e.g.*, in indolent ulcers of skin and mucous membrane, best obtained by small frequent doses.—B.M.J. ii./09,1606.

Ulcerative stomatitis, common amongst ill-fed children, well treated by 2 to 5 drops of Laudanum twice daily.—*ibid.*

Gangrenous varicella in year-old child cured by Iodoform dressing and 1 minim of Laudanum every 4 hours.—*ibid.*

Quiets nervous irritability, and gives a welcome spur to jaded nerves. For infants dose is ¼ minim of Laudanum for every three months of life. Can be repeated every 6 hours. With care no danger of undesirable consequences.—*ibid.*

In cases of peritonitis from perforation of stomach or bowels where surgical treatment is undesirable Opium may be safely resorted to. In peritonitis there is marked tolerance to Opium even by infants.—*ibid.*

Looseness of bowels well treated by Laudanum. In colitis where tenesmus is distressing, and stools contain blood and mucus supplement dose by mouth by rectal injections (2 to 5 minims for a child) with a few grains of powdered Ipecacuanha in ½ oz. of thin boiled starch.—*ibid.*

Given as hypnotic and not to relieve pain. Opium should be taken 2 to 3 hours before bedtime.—*ibid.*

Its use in acute pneumonia may be attended with risk. In uræmic convulsions may be useful. To test truthfulness of statement of Morphine maniacs who have undertaken to cure themselves, the **Urine should be examined for Morphine.** At the end of 8 days from the beginning of abstinence the drug should have passed completely from the system.—*ibid.*

Melancholia—the mental pain of—treated by tonics, and in addition 5 minims of Laudanum thrice daily given without patient's knowledge, rapidly increasing until definite result.—B.M.J. i./11,804.

Pruritus vulvæ in a severe case, 1 grain doses in pill was the only drug giving relief.—B.M.J. i./12,472.

Sciatica. Opium Extract ½ grain with Valerian in a mixture every 2 hours or Opium Extract ½ grain with or without Cocaine Hydrochloride ⅓ grain in suppository.

If the Opium Extract (½ grain) be combined with Belladonna Extract ⅓ grain in the suppository, constipation will be prevented.—Pr. March 1911, p. 459.

Abuse of Opium, Morphine, and Cocaine.

The International Opium Convention of 1912 awaits ratification. Cocaine smuggling into India proceeds to a great extent. China has the importation of Opium well in hand.—P.J. i./12,154; B.M.J. ii./13,1102, *c.f.* also Cocaine.

Third International Opium Conference Report.—B.M.J. i./15,636.

The British Government hoped to bring the deliberations of the previous International Conferences, and in particular the laws, regulations and measures contemplated by the Opium Convention of 1912 to confine to medical and legitimate purposes the manufacture, sale and use of Opium, Morphine, Cocaine and similar noxious and habit-forming drugs before the Peace Conference in Paris with a view to the adoption of a resolution binding the Powers represented at the International Conference to the speedy enforcement of the measures in question—the resolution to be made binding on the enemy powers also.—B.M.J. i./19,321. See also ***Dangerous Drugs Bill,*** p. 951, before House of Commons, May 4/20 (P.J. i./20,468).

Smoking Opium. An illustrated account of its preparation.—Prof. H. G Greenish, P.J. i./16,517.

P1 **Emplastrum Opii** (B.P. 1898). 1 in 10 of Resin Plaster.

Opium locally it is stated has no effect.—B.M.J. ii./09,329.

Fr. Cx., Opium Extract 1, Elemi 1, Diachylon Plaster (Fr. Cx.) 2.

P1 **Extractum Opii (Siccum)** (*Off.*) is now powdered. It is same strength as B.P. 1898. U.S., P. Austr., Ned., Helv., Belg., Hung. Foreign Synonym—Extractum Tebaiaco.

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm**).

An aqueous extract standardised to 20% of morphine.—F.I. adopts.

Fr. Cx. has the same with maximum single dose 1½ **grains; maximum** in 24 hours 5 grains approximately.

P1 **P. Jap.** has approx. 7% morphine.

P1 **Extractum Opii Liquidum** (*Off.* and B.P. 1898).

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

Extract of Opium 0·75, Distilled Water 16, Alcohol (90%) 4. Is of same strength as Tincture of Opium (B.P. '98), containing 0·75% of morphine.

P1 ✱ **Liquor Opii Sedativus.** (*Battley* T.M. 12765). Dose 5 to 15 minims. (**0·3 to 1 Cc.**). A proprietary hypnotic and sedative. Double the strength of Tincture of Opium, *i.e.*, it contains 2% Morphine.

Origin of and details of composition of a preparation intended to resemble the latter.—P.J ii./14,136,213.

P1 ✱**Papine.** (T.M. 214925). A proprietary article.

Dose.—1 drachm (=⅛ grain Morphine). Children under one year 2 to 10 drops. Said to contain the anodyne principles of opium without the narcotic and convulsive properties.

Ⓟ**Linctus Opiatus C. X.**

Liquid Extract of Opium 2 minims, Oxymel of Squill 20 minims, Dilute Sulphuric Acid 5 minims, Treacle 20 minims, Water to 1 drachm.

Ⓟ**Linctus Scillæ St. M.'s H.**

Oxymel of Squill ½ drachm, Compound Tincture of Camphor 15 minims, Honey to 1 drachm.

Ⓟ**Linctus Scillæ Opiatus.**—*Syn.* **Linctus Camphoræ Compositus St. Bart's., L. H. Gee's Cough Linctus, N.H.W., E.L.**

Dose.—1 drachm (3·5 Cc.).

Paregoric, Oxymel of Squill, and Syrup of Tolu, equal parts.

Ⓟ**Linctus Tolutanus cum Opio.** **Brompton H.** uses Syrup of Squill *vice* Oxymel in latter.

Ⓟ**Linimentum Opii** (*Off.* and B.P. 1898).

Tincture of Opium 1, Liniment of Soap 1; filter after a few days. A commonly used anodyne for pain.

Dixon says has no effect.—B.M.J. ii./09,329.

Ⓟ**Mistura Sodæ cum Opio, St. M.'s H.**

Liquid Extract of Opium 3 minims, dilute Hydrocyanic Acid 2 minims, Sodium Bicarbonate 6 grains, Water to 1 ounce.

Ⓟ**Pulvis Cretæ Aromaticus cum Opio** (*Off.*, 1898).

Dose.—10 to 60 grains (0·6 to 4 Gm.).

Contains Opium 1 with 39 of Pulvis Cretæ Aromaticus, which has *dose* 10 to 60 grains (0·6 to 4·0 Gm.). The latter was the old "Aromatic Confection." ⓅTablets each 5 grains (0·3 Gm.).

P1 **Pulvis Opii Compositus, B.P.** 1885.

Dose.—2 to 10 grains (0·12 to 0·6 Gm.).

Opium 3, Black Pepper 4, Ginger 10, Caraway Fruit 12, Tragacanth 1. Contains 1 of Opium in 10.

P1**Tablets** of Opium ½ and 1 grain.

Ⓟ**Tinctura Camphoræ Composita.**—*Syn.* PAREGORIC. (*Off.*, and B.P. 1898). Is known on the Continent as **Tinctura Opii Benzoica.** *Syn.* FR. CX. 'ELIXIR PAREGORIQUE.' *Dose.*—½ to 1 drachm (2 to 4 Cc.).

Tincture of Opium 50, Benzoic Acid 5, Camphor 3, Oil of Anise 3, and Alcohol (60%) to 1000. F.I. requires 0·05% Morphine. *Off.* approximates this. FR. CX. has this strength.

ⓅP.G.V. and **Ph. Ned.** have 0·05% Morphine, but amounts of other ingredients varied. ⓅP. **Jap.** has 1 of Opium in 200.

Flavoring.—Syl Coriandri, Glyl Pini; Elixir Aromaticus.

Ⓟ**Tinctura Opii Camphorata, U.S.**

Average dose.—1 drachm.

Similar in composition. 1 of Powdered Opium in 250.

The presence or otherwise of Morphine may be detected and indeed compared with a Standard Paregoric by working on as small an amount as 2·5 Cc.

of a specimen. The details of the method must be carefully adhered to — Bird, P.J. ii./05,155.

Ⓟ**Syrupus Camphoræ Compositus, Bristol Infirmary** (revised).

Dose.—1 drachm (=laudanum ¾ minim approx.) occasionally.

Benzoic Acid 45 grains, Glacial Acetic Acid 7 drachms 20 minims, Vinegar of Squill and of Ipecacuanha each 10 ounces, Anise Oil 30 minims, Camphor 30 grains, Opium Tincture 2 ounces, 5 dr. 20 minims, Sugar 7 lbs., Caramel *q.s.*, Water to 1 gallon. Pharm. Form advises at least 2½ ounces of Spirit to dissolve the oil, Camphor and Benzoic Acid. Mix the solution with the Laudanum and add to the cold syrup with stirring, then the colour.

P1 **Tinctura Opii**—*Syn.* LAUDANUM (*Off.*). *Syn.* TINCTURA THEBAICA.

Dose.—20 to 30 minims (**1·2 to 2 Cc.**), or 5 to 15 minims (**0·3 to 1 Cc.**), repeated.

Standardised to contain 1% (B.P. '98 was 0·75%) of anhydrous Morphine.

N.B. P1 *Laudanum of the '98 B.P. is now also* P1 *by Order in Council Feb. 9th, 16.*

P1 **U.S.** IX. has 1 of Granulated Opium (10 to 10·5% Anhydrous Morphine) in 10 of Diluted Alcohol (49% by vol.). **Ph. Ned.**, **P. Hung.** and **P. Belg.** contain 1% Morphine, made with 70% Alcohol. FR. Cx. dissolves 1 Gm. Opium Extract in 19 Gm. Alcohol 70% to produce the same strength.—*Maximum single dose* 35 minims, and during 24 hours 110 minims approximately. We found Sp. Gr. of this to be 0·902. F.I. requires 10% strength by percolation with Alcohol 70% and to contain 1% Morphine. *Off.* approximates this.

It is desirable to mix the dried Opium in coarse powder with twice its weight of washed and dried sand and to percolate with Spirit without macerating first of all. Conducted in this way the Opium will not 'block,' similarly also in the case of Tinctura Opii Crocata.—P.J. ii./09,2.

For estimation, see Vol. II.

Flavoring.—Syl Menthæ Piperitæ, Syl Rosæ; Syrupus Zingiberis.

Diphtheria, laryngeal stenosis of, treated by small doses every four hours (with Antitoxin).—B.M.J.E. i./06,63.

Uses.—*See* Opium.

P1 **Tablets** = Tincture of Opium 5 and 10 minims are prepared.

P1 ✱**Nepenthe** (T.M. 464) (or ANODYNE TINCTURE) is similar and is given in dose as Tinctura Opii (*Off.*). Incompatible with alkalis.

P1 **Tinctura Opii Crocata.** SYDENHAM'S LAUDANUM.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

P1 F.I. requires 1% Morphine. FR. Cx.—Opium 100, Saffron 50, Cinnamon Oil 1, Clove Oil 1, Alcohol 30% 1000—all by weight (conforms with F.I.). Max. single dose, 2 Gm. (=30 minims), max. during 24 hours 6 Gm. (=90 minims) approx. Other continental formulæ approximate this.

P1 **Vinum Opii Crocatum.** as used in Thieleman's Koleradraber (*q.v.*), in Norway, has the composition:—Opium Powder 15, Ceylon Cinnamon 1, Cloves 1, Saffron 5, Malaga Wine 150, *i.e.*, approximating the Tincture of P.G.

P1 **Tinctura Opii Deodorati, U.S.**

Average dose.—8 minims (**0·5 Cc.**).

Granulated Opium 100 (purified by Petroleum Benzin 75), in Alcohol 200, Water to 1,000.

A modified method of deodorising (Gordon's) is mentioned by Caspari. Macerate Opium 100 Gm. in water *q.s.*, and concentrate infusion to 500 Cc. Heat to 82° C., add Paraffin, melting at about 50° C., 150 Gm. in small pieces, and when liquefied shake thoroughly 10 minutes. Allow to cool, remove paraffin cake, and make up filtered liquid to 800 Cc. with Water and Alcohol 200 Cc., finally with Water to 1,000 Cc.

Ⓟ**Tinctura Opii Ammoniata** (*Off.*).—*Syn.* SCOTCH PAREGORIC. *Dose.*—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Contains 0·1% Anhydrous Morphine. Is $\frac{1}{10}$ weaker than B.P. '98. One ounce contains approx. $\frac{1}{2}$ grain anhydrous morphine.

Ⓟ**Trochisci Opii B.P. 1885.**

Contained $\frac{1}{10}$ grain Extract of Opium in each, with liquorice.

Trochisci Sedativi, T.H., contain the same quantity with fruit basis, and are marked 'S.'

P1 **Unguentum Opii.** 1 of extract in 10 of Unguentum Cetacei.

P1 **Unguentum Gallæ cum Opio.** (*Off.* and B.P. 1898).

Contains 7·5% of Opium with Gall Ointment (Galls 1, Benzoated Lard 4).

P1 **Collapsible Tubes** with rectal tube are for use in hæmorrhoids. Dixon says opium locally has no effect.—B.M.J. ii./09,329.

P1 **Vinum Opii, B.P. 1885.**

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Contained 1 of Extract in Sherry 20, with Aromatics.

P1 ✱ **Alopon** (T.M. 365294). *Dose.*—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**) A powder comprising the hydrochlorides of a mixture of the Opium alkaloids. Readily soluble in water. Gastric and intestinal sedative; also in nervous conditions and in diseases of the respiratory tract. Used as an analgesic and hypnotic prior to operation as an adjunct to general anæsthesia.

Tablets, Oral, 1/6 grain in each. *Dose.*—1 or 2 tablets, Hypodermic, 1/3 grain. *Solution*, 2 per cent. for Oral use. *Single Dose.*—15 to 30 minims, repeated 5 to 15 minims. *Glass Capsules* 1/3 grain in each also 1/3 grain combined with Atropine 1/150 grain and 2/3 grain with 1/150 grain Scopolamine.

P1 ✱ **Omnopon** (T.M. 317126) *Syn.* PANTOPON—*Dose per os*—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**) thrice daily.

This preparation is stated to be a mixture of the soluble hydrochlorides of Opium Alkaloids in the form of a brown powder. Sahli experimented with the various alkaloids in Opium and concluded that the most effective narcotic would be a stable solution of these in which the strength of each could be determined. 1 Gm. of Omnopon is equivalent to 5 Gm. of 10% Opium.

Composition.—Morphine 52%, Narcotine 20%, Codeine 2%, Papaverine 2·5%, Thebaine 1%, Narceine 1·2%, other alkaloids 4%, Water 8%, Hydrochloric Acid 9%.—F. W. Watkin Thomas, Bio-Chem. Jl *Vol. VI*. part 4. 1912.

When used as an injection (Ampoules are made) 1 Cc. of 2% solution is injected 1 hour before operation, though the dose should preferably be subdivided and given at intervals, *e.g.*, $\frac{1}{2}$ Cc. 1 hour prior to operation and another $\frac{1}{2}$ Cc. just before, *i.e.*, as preliminary to Chloroform or Ether anaesthesia.—Anodyne action is striking.—L. ii./10,1169; L. i./11,368,673.

P1 **Tablets** of 1/6 grain Omnopon each = 5/6 grain Opium *Off.* For internal medication in suitable cases.

P1 **Ampoules** contain 1·1 Cc. of 2% solution in 25% Glycerin and Water = 25 minims Opium Tincture B.P. 1898. 1 Cc. = $\frac{1}{3}$ grain Omnopon.

Phthisical cough relieved. Especially useful in advanced cases (night sweats, etc.) where palliative treatment is alone possible. Control of hæmoptysis by 1/3 grain. Relieved pain in cancer cases and in gastric ulcer and useful in diarrhœa and intestinal catarrh. Used with advantage in the first stage of labour without diminishing force or duration of the uterine contractions. Dyspnœic attacks of bronchial asthma rapidly subside after 1/3 grain subcutaneously. Can be used in cases of chronic renal insufficiency in 1/3 grain doses for dyspnœa.—C. L. Williamson, and G. W. N. Joseph, M.P.C., Sept. 17 '13.

Omnopon ⅔ grain **with Scopolamine** 1/150 grain is used as intra-muscular injection to subdue post operative pain. May be followed by a second dose ½ the strength.—Said to be a safe narcotic.—L. ii./11,672,

For anæsthetic purposes deep intramuscular injection of 1 Cc. 1¼ to 1½ hours before operation, followed by a local anæsthetic, to infiltrate the tissues in the operation area. When ether is employed the amount required is greatly lessened.—H. M. W. Gray, L. Sept. 2,1911, and B.M.J., Aug. 22,1914. See also W. de C. Wheeler, Med. Press. Apl. 1,1914, also M. Ramsay on its use in ophthalmic surgery.—L. April 25. '14.

OVULES VAGINALES.

Ovules are oviform vaginal pessaries prepared with Glycogelatin basis or with Theobroma Oil basis.

Ovules dissolve slowly and hence produce a continued action of the medicament on the parts in cases of leucorrhœa, also for ulceration and inflammation of the cervix uteri.

Each Ovule weighs approximately 4 drachms (15 Gm.):—

Adreucaine = ½ and 1 Cc. (anodyne and astringent).

Apiol, 5 minims (to relieve amenorrhœa).

Aristol, 5 to 10 grains (antiseptic).

Ⓟ Belladonna Extract, 1 grain (sedative).

Boric Acid, 15 grains (soothing).

Carbolic Acid, ½ grain (antiseptic).

Ⓟ Cocaine, ¼, ½ and 1 grain (local anæsthetic).

Ⓟ Cocaine, 1 grain with Adrenalin $\frac{1}{500}$ grain (anæsthetic and astringent).

Copper Oleate, 5 grains, *c.f.*, p. 583 (in malignant disease).

P1 Ergot Extract, 2 grains (astringent ?).

Hamamelis, 10 minims of Liquid Extract (anti-hæmorrhagic).

Ichthyol, 5, 10 and 12½% (30 grains in each) (in ulceration, antiseptic and stimulant). Preferably made with Theobroma basis.

Iodine, 1 grain (astringent and antiseptic).

Iodoform, 5, 10 or 15 grains (antiseptic).

Iodol, 2 grains (antiseptic).

Ⓟ Morphine Hydrochloride, ¼ and ½ grain (anodyne).

Naphthol, 1 grain (antiseptic).

Ⓟ Opium, 1, 2 grains (sedative).

Quinine Hydrochloride, 3 grains (in leucorrhœa and to check conception).

Resorcin, 3 grains (antiseptic).

Suprarenal Extract, 5 minims (hæmostatic).

Tannic Acid, 8 grains (astringent). Made with Theobroma basis.

To be efficient these ovules must be inserted as far as possible whilst the patient is in the supine position with the hips raised. A sanitary towel may be worn at the same time. Most effectual at bedtime.

Gelatin Ovules for hot climates are made slightly harder.

Theobroma Ovule Mass for hot climates.

Suitable proportions of White Wax raise the Melting Point of Theobroma Oil. Our experiments using Theobroma Oil Melting Point 93° F. (before melting and on resolidifying 90·5° F.) and White Wax melting at 142° F., show the following :—

A mixture containing	2½%	White Wax gives M.Pt.,	90·5° F.
,, ,,	4 % and 5%	,, ,, ,, ,,	91·5° F.
,, ,,	10%	,, ,, ,, ,,	103° F.
,, ,,	15%	,, ,, ,, ,,	115° F.
,, ,,	20%	,, ,, ,, ,,	122° F.

On the whole we consider the 15% addition of Wax the best—it melts in contact with the mucous membrane. See also **Suppositories.**

OXYGENIUM.

OXYGÈNE Fr. Cx.

O=16.

Oxygen is obtained commercially by the rectification of liquid air by a process of fractional liquefaction. It is available so made of not less than 98·5% purity. For detailed description of the apparatus used see Thorpe. The Barium Oxide process is not used now.

Liquid air as a source of Oxygen, *e.g.*, for aviators at high altitudes—can be obtained up to 80% pure.—B.M.J. ii./19,77.

Sodium Peroxide (Oxylith) has been used for generating oxygen in Metal generators by the gradual addition of water but our experience is that the method is not suitable for therapeutic purposes—much heat is evolved, strongly alkaline vapour and spray are liable to be carried over and the method is hardly one which can be trusted to a nurse or layman.

It is sold compressed in **Cylinders** containing the equivalent of 20 cubic feet (560 litres approximately) at normal temperature and pressure and upwards for inhalation from an **Inhalation Bag.** By the aid of this, the oxygen may, if desired, be mixed with air as it is administered to the patient, or the gas may be passed direct into the patient's mouth by a glass tube or from a funnel which is suspended above the face (the latter method is probably of little use—*vide infra*).

Sp. Gr. 1·10527 (Air=1). It is therefore slightly heavier than air, 1 litre weighs 1·429 Gm. at 0° C. and 760° m.m. pressure. At 20° C. and under normal pressure 1 litre of water dissolves 28 Cc. of oxygen.

Ozone. O_3=48.

Is known as active or tri-atomic oxygen. It is a very powerful oxidising agent, the third atom of oxygen in the molecule being in the labile condition.

The effect of passing electrical currents through oxygen is to produce ozone, which may be recognised by the peculiar odour. When in large quantity it is irritating to the air passages, giving rise to cough and also producing headache. Mildly ozonised air has been inhaled for phthisis and the spasmodic stage of whooping cough.

It has been suggested that inhalation of Ozone is injurious to the respiratory tract rather than beneficial in warding off injurious diseases, but this is exaggerated. Experience in the Central London Railway and elsewhere proves the contrary. There is no doubt that Ozone does not only mask bad smells but destroys them. —Ozonair Ltd.

Dysentery treated by Ozone after Ipecacuanha and Opium failed to keep it in check. Ozone has a powerful action on cholera and typhoid organisms. The lower intestine was gently washed out from time to time with ozonised water and ozonised water was freely drunk by the patient while the Ipecacuanha and Emetine was continued. The air of the sick-room was also kept slightly ozonised. The result was a cure.—F. M. Lessing, L. ii./13,1255.

Surgical use of Ozone. Sinuses healed.—G. Stoker, L. i./17,797.

Uses of Oxygen.—

Recommendation to warm the gas by discharging it into a rubber gas bag and keeping in same for an hour or two prior to use so that the Oxygen may acquire the temperature of the room. Open the cylinder in an adjoining room so as not to alarm the patient. To use the cold gas as it issues from the cylinder (the gas expanding from a cylinder becomes icy cold) is unsatisfactory. —B.M.J. i./11,416. A **hot water box** may contain a spiral metal tube through which the Oxygen passes to the patient from the bag.

A Woulf's Bottle containing hot water is useful—the gas being bubbled through it.

Inhalation of oxygen is of great service in pneumonia, bronchitis, asthma, angina; it relieves dyspnœa, and reduces temperature. May be used after chloroform to accelerate recovery. It is the best cardiac and respiratory stimulant. Severe cases of whooping cough have been treated—give just before onset if possible. Vomiting of phthisis.—A few whiffs of Oxygen are stated to be effective in preventing the severe form of cough in phthisis which usually ends in vomiting. It is inhaled with success in cardiac failure and Bright's disease.

A successful antidote to morphine, opium, strychnine, cyanide, and carbon monoxide poisoning; for resuscitation after partial drowning, and threatened death from inhalation of nitrous oxide.

Its local use is valuable in ulcers and alopecia.

In some cases of capillary bronchitis of infants inhalation of Oxygen has been found of great value.—Yeo.

Benjamin Moore's apparatus consists of a collapsible gas-bag having trays of Caustic Soda or Soda Lime to take up the CO_2—the bag is filled from a cylinder. Patient breathes backwards and forwards through an air-tight mask and wide tube.—B.M.J. ii./09,840.

Injection of Oxygen.

Endovenous injection of 120 Cc. of oxygen slowly in the case of a patient *in extremis*.—L. i./03,75.

Sciatica has been treated by the hypodermic injection (deeply) of 250—400 Cc. of Oxygen.—P.J. i./07,735.

In the dyspnœa of tuberculosis, gas poisoning, pneumonia, bronchial asthma, and operative cases oxygen has been *injected subcutaneously* until a lump the size of a closed fist is raised. The local emphysema is virtually an artificial lung lasting for hours; results remarkable,—the body absorbing that which is necessary. Animal experiments suggest that Oxygen Injections should be made as a treatment for tetanus.—H. O. Howitt, Medical Press, per P.J. i./15,19; B.M.J. i./15,973. (The last reference gives extended bibliography to earlier work).

OXYGEN SUBCUTANEOUSLY. William Ewart supports Captain Oswald Smith's method and says that the artificial oxygen emphysema is capable of rescuing men from incipient gangrene and suggests other diseases in which the method might be tried, *e.g.*, cancer.—B.M.J. i./17,702.

Intra-abdominal use of oxygen in tuberculosis. In tuberculous peritonitis injected intraperitoneally until the distension by the gas corresponded with the previous distension by fluid.—L. i./09,1543.

For poisoning by asphyxiating gas subcutaneous injection of oxygen advised *vide* Poisons at end under par. Gas. Trench feet have been treated by injecting Oxygen subcutaneously, see Trench Foot, Therap. Index.

Atmospheric Pollution.—Its causes and prevention.

The percentage of CO_2 in crowded rooms has nothing to do with the sense of discomfort. It cannot get into the body—respiration prevents it. The amount of this gas in the lungs is always kept the same. A person placed in any CO_2-containing atmosphere will not feel ill effects until the amount rises to over 60%—the normal amount in the lungs. Similarly the oxygen in a crowded room is never diminished by more than 1%—this diminution has no physiological effect whatever. The real source of pollution and infection is in the speaking, coughing and sneezing by man—the spray of saliva passing out from the mouth. Pneumococcic and other cold infection from man to man in this way has been conclusively proved.

L. Hill and F. F. Muecke investigated the reason why people (children) exposed to the weather and wind never catch colds, whilst the moment they return to crowded places and chill autumn weather and they return to schools the colds run round and everyone catches them. The reason is to be sought in the fact that the mucous membrane in the cool surroundings and outside air is taut—there is very scanty secretion, whilst a heated room pretty well saturated with moisture causes the mucous membrane of the nose to become turgid with blood and covered with thick secretion and the tissues are all swollen. (A fan in a hot room causes the opposite effect—bringing the membranes into the first state again.) On going out into the cold open air the blood goes out as the vessels contract, but the mucous membrane is still boggy, it pits and the secretion (and tissue lymph) is thick upon it—a medium for the growth of bacteria. Adequate ventilation is essential. The immunity to 'colds' of those who live an open air life is well known. Keep the air in rooms cool and in motion. Confinement of air space, radiator heating, absence of movement of the air (draughts) in modern buildings and the like is diminishing metabolism and vigour, health and happiness—quite apart from causing consumption. Skyscrapers and the artificially lighted cellars people have to live and work in must be condemned. —Leonard Hill, L. i./13, 1286 *et seq.*, see also L. ii./12,767.

Leonard Hill describes a new **Oxygen Mask** of celluloid with a curtain of washable material and heating box for evaporating alcohol and adding vapour of alcohol to the oxygen. (The common idea that the processes of combustion in the body are accelerated by breathing oxygen is erroneous.)—B.M.J. i./12,71.

Haldane's Oxygen Apparatus for inhalation. Improved face piece and bag to attach to cylinder.—B.M.J. i./17,181; ii./19,65.

The Oxygen Content of the Air.—212 determinations during period of ten months April, 1911—January, 1912, showed no material fluctuation despite all possible alterations in climatic conditions, including periods before, during and after the vegetative season. The averages were 20·952% Oxygen and 0·031% Carbon Dioxide which maintain the results of Cavendish in 1783 and de Marli in 1787 as to the uniformity of air as regards its Oxygen content.

The interdependence between the amounts of Oxygen and Carbon Dixoide is so constant that estimations of the latter made in the Loudin apparatus may be taken as accurate indications of the Oxygen content, *e.g.*, for every 0·01%

increase in Carbon Dioxide a corresponding increase in the percentage of Oxygen may be assumed.—Na., June 19, 1913,400.

Pleurisy treated by injections of air.—B.M.J.E. ii./11,75.

Oxygen and Alcohol Inhalation.—W. H. Willcox has advised as cardiac stimulant the use of Alcohol Vapour mixed with Oxygen. A wash-bottle with an inlet and exit tube is used, the Oxygen passing by the inlet tube in a rapid stream, dipping about half an inch or so below the surface of the contained Absolute Alcohol. At ordinary temperatures the Oxygen bubbled through the Alcohol would contain from 4 to 5% of Alcohol vapour (from 1 to 2 grains of Alcohol per litre). After from three to five minutes the full therapeutic effect is obtained, and lasts for several minutes. In cases of severe cardiac failure the mixture of Oxygen and Alcohol vapour should be given for five minutes every half hour. The Alcohol vapour is absorbed by the lungs and carried direct to the heart, on which it produces its direct action. The administration is pleasant, non-irritating and invigorating to the patient. Has been used in a large number of cases with great benefit, *e.g.*, in pneumonia with cardiac failure, cases of heart failure following Chloroform anæsthesia and various surgical operations, angina pectoris, asthma with cardiac failure, septicæmia, typhoid fever, myocardial degeneration, dilatation of the heart, valvular lesions of the heart, collapse after epidemic diarrhœa, etc.—B.M.J. ii./10,1408 to 1411. Apparatus to give varying dose percentage of Alcohol.—B.M.J. ii./10,1562,1658.

In some experiments on Chloroform poisoning in animals Prof. Collingwood found that inhalations of Alcohol Vapor combined with Oxygen had remarkabel beneficial effect in cardiac failure. Has been employed clinically by Willcox (*vide* above). Suggested use in pneumonia.—L. ii./11,495.

Woulf's bottle for giving Amyl Nitrite or Ethyl Iodide with Oxygen simultaneously. The Amyl Nitrite or Ethyl Iodide is placed on cotton wool or blotting paper in the bottle with exit tube raised so as to allow the Oxygen passing through to dilute the vapour. As the Nitrite evaporates the tube is pushed down. The bottle is also suitable for use with Alcohol, Brandy, Friar's Balsam or for simply warming or moistening Oxygen.—Sir L. Brunton, B.M.J. i./13,833.

Oxyqua-Mackay. *Dose.*—A wineglassful or *ad lib.*

An oxygenated water of great use in combatting sickness and vomiting of pregnancy or from any cause, *e.g.*, alcoholic excess and in gastric ulcer, acidosis.

In a case of sickness of pregnancy where every food had been rejected during a period of three weeks the patient had complete relief after four doses, each of a tablespoonful, of Oxyqua—an interval of from three to five minutes between each dose. After the fourth dose the patient was able to take milk with the Oxyqua and experienced no sickness thereafter. Indeed from that time whenever sickness was felt at all a dose or two of the oxygenated water gave her complete relief. Also used in anæmia and pneumonia, and applied locally to indolent external ulcers.—Craik Taylor.

Liquid Air.

Consists mainly of oxygen and nitrogen, and when freshly prepared is a nearly colourless liquid boiling at—190° C. As the more volatile Nitrogen evaporates the temperature rises and the liquid assumes a bluish tinge,—the colour of liquid oxygen. With the exception of oxygen and chlorine, which has a yellowish tinge, most gases are colourless in the liquid condition.

Nævi treated by freezing with Liquid Air.

Though cases were of the vulva, penis and margin of the anus, none gave trouble regarding sepsis,—all healed normally. Painless.

For a port wine stain or large capillary nævus an application of 5 to 7 seconds is sufficient, for cavernous nævi 8 to 10 seconds. Mode of action very similar to that with Carbonic Snow but neither Liquid Air nor Solid Carbon Dioxide destroy the pathogenic properties nor inhibit activity of micro-organisms,—this must be remembered when treating lupus and rodent ulcer. Although possessing the quality of intense cold it is difficult to control, being a liquid. It may be applied by a pad of cotton wool wrapped on the end of a cane dipped into the liquid contained in a Dewar's flask.

Air Liquefying Apparatus (Hampson's Patent).

This apparatus depends upon a method by which a moderate amount of refrigeration, produced by the expansion of a gas, may be accumulated and intensified till it reaches the point at which the gas becomes liquid under atmospheric pressure. The method consists in directing all the expanded gas immediately after its expansion, over the coils which contain the compressed gas that is on its way to the expansion point. The cold developed by expansion in the first expanded gas is thus communicated to the on-coming compressed gas, which consequently expands from, and therefore to, a lower temperature than the preceding portion. It communicates in the same way its own intensified cold to the succeeding portion of compressed gas, which in its turn is made colder both before and after expansion than any that had gone before. This intensification of cooling goes on until the expansion temperature is far lower than it was at starting, and the effect is so powerful that even the small amount of cooling due to the free expansion of gas through a throttle-valve may be made to liquefy air without using other refrigerants.

The amount of refrigeration due to free expansion was ascertained by Joule and Thomson, and is in the first place proportional to the fall of pressure. Air at 0° C. is cooled 0·29 of a degree C. for every atmosphere of pressure-drop. This cooling, however, increases with the descent of the temperature from which expansion takes place, and the law is that it is inversely proportional to the square of the absolute temperature. Thus expansion of air from 4½ atmospheres to 1, and from a temperature of 0° C., *i.e.*, 274° Absolute, gives about 1° of cooling in the air itself. But when the air expands from ⅔ of that absolute temperature, *i.e.*, from 91° absolute, the cooling for the same pressure drop is $\frac{9}{4}$ of 1°, or 2¼°.

In the liquid state air occupies $\frac{1}{800}$th part of its ordinary volume, or in other words if liquid air be vaporised and restored to normal temperature it will expand 800 times.

Oxygen can be obtained from Liquid Air up to 80%.—B.M.J. ii./19,77.

Vacuum Vessels (Thermo-Isolators)

Are necessary for the storage of liquid air and those gases which only liquefy at low temperatures.

They are either cylindrical or globular, and consist of one glass vessel enclosed within another. The space between these vessels is thoroughly exhausted and sealed under a high permanent vacuum. Heat radiates across the vacuous space very slowly, consequently liquid stored in a vacuum vessel is admirably insulated from the action of external heat and only vaporises slowly.

The efficiency of the vacuum vessel is increased by silvering as radiation from outside is thus partially reflected.

Liquid air evaporates from vacuum vessels at the rate of from 5% to 15% per 24 hours, according to the size of the vessel, the evaporation from small vessels being more rapid than from large.

✱**Thermos** (T.M. No. 296745 Class 13 and 289470 Class 15) **Flasks** are on the principle of vacuum vessels.

A charcoal vacuum is employed in the new metallic containers for liquid air.—Dewar C.D. i./06,909.

Hydrogen Liquefying Apparatus (Morris W. Travers'.).

It has been found that hydrogen, when compressed at normal temperatures and allowed to expand in an apparatus like the Hampson Air Liquefier, does not become cooled but on the contrary, slightly heated. When, however, its temperature is reduced to −80° C., or lower, before it enters the regenerator coil, it becomes further cooled on free expansion, so that the principle of self-intensive cooling employed in Hampson's Air Liquefier can then be applied to the liquefaction of this gas.

(For further information on liquefaction of gases, *see* "The Experimental Study of Gases," by Prof. Morris W. Travers.)

Hydrogenit is said to be a mixture of dry Soda-lime and ferro-silicon or other silicon alloy. When acted upon by heat 3 kilos give about 1 cubic metre of hydrogen.—Chem. Zeit., 1911,35,1,273, per P.J. i./12,31.

The preparation and commercial uses of hydrogen —A. W. Crossley, P.J. i./14,604,637,676.

Calcium Hydride or **Hydrolete** CaH_2 is used as Hydrogen generator by decomposing with water.

Ferrosilicon process. Ferrosilicon falls into Sodium Hydrate solution (covered with Hydrocarbon Oil to prevent frothing). Also other processes. Silicon alone is also used.—P.J. ii./15,214.

Nitrogen. — N = 14·01. Nitrogen is a colourless, odourless tasteless gas constituting about 77% by weight (79% by volume) of the atmosphere. Nitrogen prepared from the atmosphere contains a small amount of **Argon** *q.v.* 1 litre of Nitrogen weighs at 0° C. and 760 mm. pressure 1·25072 Gm. It is only slightly soluble in water. The Nitrogen group of elements includes Nitrogen, Phosphorus, Arsenic, Antimony, and Bismuth. These are in combination sometimes trivalent and at others pentavalent (Bismuth in its well characterised inorganic compounds is always trivalent—but in organic compounds also pentavalent).

The treatment of hæmoptysis in phthisis by **artificial Pneumothorax** consists in introducing Nitrogen between the two layers of the pleura through Saugman's or K. Peterson's needle (described), and thus inducing collapse of the lung. The apparatus used for the purpose is described. There is no chosen spot for the puncture,—it is commonly made in one of the axillary lines in the seventh or eighth intercostal spaces The aim is to find a spot where the lung is healthiest and to avoid the neighbourhood of cavities. A hypodermic injection of Morphine is desirable ½ hour before the operation. A local anæsthetic such as Eucaine is also advisable. The quantity of Nitrogen or air injection is 200 to 300 Cc. Oxygen has also been suggested, but animal experiments were not in favour of its use.

Pneumothorax Apparatus. Many hundreds of Nitrogen injections have been made.—L. ii./11,145 *et seq.*; ii./13,1627. See also B. Morriston Davies, B.M.J. i./14,897.

Pulmonary tuberculosis treated by Nitrogen Compression, three separate injections of 500 Cc.—G. Lucas, B.M.J. ii./15,211.

Active Nitrogen.

The Hon. R. J. Strutt has shown that Nitrogen, under the influence of an electric discharge, assumes an active state in the same way possibly as Oxygen does in the form of Ozone. The Nitrogen in the process acquires luminosity—a golden glow. High tension electric discharges from a Leyden Jar in certain circumstances appear to split up the Nitrogen molecule into atoms. The reunion of the atoms is accompanied by this light emission.—L. i./13,1469.

This active Nitrogen is reactive with Carbon Compounds. With Acetylene it produces a lilac colour—characteristic of burning cyanogen. Chloroform reacts with similar colour, Hydrocyanic Acid is produced. With Carbon Bisulphide a blue deposit forms which is Nitrogen Sulphide. Carbon Monosulphide is produced simultaneously. Mercury produces Mercury Nitride. Monatomic Nitrogen may possibly play a part in the formation of Protein in plant life—through the medium of bacterial agents.—L. i./13,1469; C.D. i./13,358.

PANCREAS.

In the pancreatic juice of man four distinct digestive ferments are believed to be contained, viz. :—

1. **Trypsin.**—A proteolytic ferment acting in an alkaline medium. Converts protein, albumen, *e.g.*, casein of milk and fibrin, into peptones.
2. **Amylopsin or Pancreatic Diastase.**—Converts starch into dextrin, maltose and dextrose.
3. **Steapsin.**—A lipolytic ferment (emulsifies fats).
4. **A Milk-curdling Ferment, Rennin**—converting casein into a form of peptone.

For invalids, aged persons, and those suffering from weak digestion, or those prostrated by fever or exhaustion, preparations of the pancreas of the pig (an omnivorous animal) may be employed, by means of which food may be partially or wholly digested previous to administration; their nutrition is thus maintained, and the stomach has time to regain its powers of digestion.

These preparations may also be given internally in cases of dyspepsia and defective nutrition.

The pancreas plays an important part in enabling the organism to resist infection, and the spleen is said to assist by producing an hormone which activates trypsinogen and raises the phagocytic index.—Henry H. Harrower, Pr., Aug., 1913, 289.

Diet in gout.—Pancreas and Thymus Sweetbreads are the foods richest in purins. They are frequently advised for invalids' diet. A. P. Luff says that, on the ground of Walker Hall's work, sweetbread is reasonable food for gouty patients, since its nuclein portion is only slightly absorbed. Thymus contains principally Adenin which is rapidly excreted and the pancreas contains mainly guanin, an amino purin incapable of increasing the urinary purin output and of exerting any injurious effects on the tissues. A. E. Garrod holds, however, that as it has been shown that feeding a healthy man on these foods is followed by a much increased excretion of uric acid—an increase less pronounced in the case of a gouty subject, it would appear desirable to eliminate these foods.—L. i./13,1793.

Neurasthenia, gastric neuralgia and allied disorders are often the product of auto-toxæmia arising from intestinal stasis, and not, as is generally thought the intestinal stasis the result of neurasthenia. Craik Taylor writes details of a case,—a victim of constantly recurring epileptiform seizures which had been treated with Bromides to saturation. It was diagnosed to a toxic cause as there was slight constipation and intestinal dyspepsia. Bromides were stopped and treatment with digestives and laxatives satisfactory.

Cushing showed that the posterior lobe of the pituitary has an inhibitory action on the oxidation of carbohydrates, and is thus antagonistic to the pancreas which is concerned in the oxidation of carbohydrates For therapeutic use, therefore, a pancreas should be used that has previously been activated by removal of the posterior lobe of the pituitary.—Pres., Apl., 1913.

Pancreatinum, U.S.

Dose.—2 to 4 grains (0·12 to 0·25 Gm.).

A cream-coloured amorphous powder, slowly soluble in water, and containing not more than 10% insoluble; insoluble in alcohol; consisting principally of amylopsin, trypsin and steapsin, obtained usually from the hog. It digests albuminoids and converts if of U.S. Standard not less than 25 times its weight of starch into soluble carbohydrate. Assay process is provided.

Fr. Cx. states it loses its activity on warming solutions of it above 50° C. Its peptonising action is best in neutral or very slightly alkaline or very slightly acid solution. The Assay process provides for conversion of 12½ times its weight of dried fibrin.

Pancreatin Tablets, 2½ grains, with Sodium Bicarbonate, are prepared. One is sufficient to peptonise half a pint of milk.

Liquor Pancreatis, **Pancreatic Solution** (*Off.* and B.P. 1898).

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

This solution contains the amylolytic, the proteolytic, and the milk peptonising properties of the pancreas, and is made by extraction of the fresh pancreas of the pig, freed from fat and external membrane.

The pancreas is sometimes called the 'sweetbread,' but the sweetbread known to cookery is the thymus gland of the sheep, and *not* the pancreas, which, being tough and stringy, is inferior in value to the sweetbread of the throat for cooking.—Ph.

Pancreatic Juice, obtained in its inactive form from the pancreatic duct, acquires powerful proteolytic activity by mixing with it a soluble calcium salt and incubation.—B.M.J. ii./06,1787.

Test.—Should peptonise 27 (B.P.'98,40) times its volume of milk.

Incompatibility.—All the liquid preparations of the combined ferments of the pancreas and the stomach are quite devoid of the ferments in question after two or three weeks. Pepsin in a slightly acid medium gradually destroys pancreatic ferments.—C.D.i./08,133.

Effect of certain Chemicals and Drugs on the Activity of Pancreatin.

In preparing our Fifteenth Edition we conducted an investigation to determine which chemicals and drugs in a selected list prevent the proteolytic action of Pancreatin. Broadly speaking we find that the following—Alum, Copper Sulphate, Ferric Chloride, Zinc Bromide, Zinc Sulphate and Syrup of Ferrous Iodide destroyed the ferment action. Acids are generally held to be incompatible.

A further investigation deals with inhibition of Amylolytic Activity. *Details see Vol. II., c.f.* also **Enzyme Action**, p. 631.

Glycosuria.—In certain forms of severe glycosuria depending on excessive activity of the liver Pancreatic preparations are valuable.—Batty Shaw.

Pancreatic juice is the digestive fluid *par excellence.* Many animals are void of a gastric digestion, but all have something corresponding to pancreatic juice. Dextrose, as far as experiments go, is the best tissue food. The internal secretion of the pancreas determines its utilisation by the organism.

Experiments show that the pancreas either specifically activates the combustion of carbohydrates, or overcomes the antagonism to this function of certain other internal secretions and so permits the body to avail itself of the ingested carbohydrates. A counterpart to the lost pancreatic excitant has been found. Diabetics for as long as eight years have continuously taken pancreatic preparations, and on suspending the treatment for only a short while, they revert to their original condition. The body is supplied with an internal secretion, and this keeps the hormonic balance sufficiently near normal to prevent, or at least postpone, the dire results of this disease.—Pres., April, 1913, vide *also Vol. II.*

In chronic pancreatitis, Keratin-coated capsules of pancreatic extract may be employed with advantage before the operation and also in cases unsuitable for operations.—Whitla, Pract. Med.

ⓟ ✱**Trypsogen** (T.M. 274836) **Tablets.**—A proprietary preparation for the treatment of diabetes said to contain the enzymes of the Islands of Langerhans, tryptic and amylolytic ferments, also gold bromide $\frac{1}{100}$ grain and arsenic bromide $\frac{1}{200}$ grain.—See also N.N.F.

Diabetes treated by Trypsogen Tablets and Codeine Sulphate ¼ grain—each thrice daily—increasing to 6 doses of each *pro die*. Sugar usually disappears at the end of three weeks.—Med. World, Oct., 1912, per Pres., April, 1913, 138.

Glycerinum Pancreatis, *Martindale,* a digestive preparation made from the pig's fresh pancreas.

Dose.—1 to 2 drachms (4 to 8 Cc.), equivalent to ¼ to ½ drachm of the official liquor.

Liquor Pancreaticus (✱Benger's : T.M. 321220).

Dose.—1 to 2 drachms (4 to 8 Cc.) in water with meals to aid intestinal digestion, or with farinaceous gruel, when cool enough to sip. As an addition to nutritive enemata, a dessertspoonful should be added to beef tea or milk gruel just before its administration. Will not keep diluted, and presence of acidity or heating over 140° F. destroys the ferment.

N.F. gives the following :—Triturate Pancreatin (U.S.) 128 grains, with Sodium Bicarbonate 6 drachms, and Water 10 ounces, add Alcohol (U.S.) ½ ounce, Compound Spirit of Cardamom N.F. ½ ounce, and Talc 120 grains. Shake well and filter, adding Water to 12 ounces, then Glycerin 4 ounces.

Each drachm represents 1 grain of Pancreatin.

Spiritus Cardamomi Compositus. Compound Spirit of Cardamom, N.F. Dissolve Oils of Cardamom 4, Caraway 1·5, Cinnamon 1, in Alcohol (U.S.) 1000, add Glycerin 130 and finally Water to 2000.

Peptonised Milk (*v. also* Peptonising Powders, *infra*).

Mix two-thirds of a pint of fresh milk with one-third of a pint of water, and warm in a saucepan to a temperature of about 140° F. (or the diluted milk may be divided into two equal portions, one of which may be heated to the boiling point and then added to the cold portion, the mixture will then be of the required temperature). Add two teaspoonsful of Liquor Pancreatis, and half a level teaspoonful of sodium bicarbonate. Pour the mixture into a covered jug and place in a warm situation for ten to twenty minutes, then boil the product. It can then be used like ordinary milk. **Gruel** can be similarly treated. *See also* Enemata and Peptonoids of Beef.

In the place of the water half a pint of lime water may be used to the pint of milk. The preparation if desired for early use may be kept at 15° C. for three or four hours ; need not necessarily be boiled.

Peptonised Beef Jelly and **Chicken Jelly** (Benger).

Restorative extracts of beef and chicken containing much of the fibrin converted into peptone or partially digested by trypsin.

Peptonising Powders.

Pancreatic enzymes mixed with sodium bicarbonate, in glass tubes. Place the powder into a clean quart bottle with ¼ pint of cool water, add a pint of fresh milk, and shake. Place the bottle in warm water for *ten minutes,* then pour the milk into a saucepan and heat quickly to boiling and allow to cool sufficiently for use. If desired, smaller proportional quantities may be utilised.

Uses.—In gastric ulcer, intestinal catarrh, for infants' use generally—and in all forms of weakened digestive functions.

Peptonising Powder for humanising Milk. *Martindale.*

To peptonise milk and simultaneously to increase the Lactose content, Lactose 400 grains containing a small proportion of Pancreatin and Sodium Bicarbonate may be added to ½ pint each of milk and cold water mixed and three to four tablespoonsful of cream. Allow to stand at about 40° C. for about 15 minutes and boil or heat the mixture in such a manner that it shall take ten minutes to reach the boiling point. Milk so treated must be kept in a cool place. To be slightly warmed again on feeding. In some instances a further dilution, *e.g.*, milk 1 to water 2 may be necessary. The result very closely approximates 6·3% Lactose, *i.e.*, the usual content in human milk.

After severe hæmatemesis 15 to 20 ounces of Peptonised Milk as enema is often necessary. Patients may not have food or water by the mouth—suppurative parotitis may develop in consequence. A rubber teat will promote flow of saliva to bathe the glands.—B.M.J.ii./09, 1297.

✱**Chologestin** (T.M. 293202).—*Dose.*—½ ounce (**15 Cc.**) well diluted after each meal. Children in proportion.

A proprietary stated to contain Sodium Glycocholate 2 grains, Sodium Salicylate 2½ grains, Pancreatin 5 grains, and Sodium Bicarbonate 5 grains in each ½ ounce.

Uses.—In conditions of intestinal putrefaction, auto-toxæmia and indicanuria. The urine is to be tested for Indican by the Permanganate Test, *c.f. Vol. II.*

It is held that by the combined administration of pancreatic and bile extractive both are carried safely through the stomach without loss of activity and hence relieve flatulent distension and prevent gall-stone formation.

✱**Tablogestin** (T.M. 322701).—Tablets of the above, 3 tablets=½ ounce.

Trypsin. *Dose.*—8 to 20 grains (**0·5 to 1·2 Gm.**).

Trypsin is stated to be produced simultaneously with Amylopsin, and from the same cells in the pancreas. This ferment is prepared commercially in the form of whitish powder, possessing an odour like pepsin. It changes proteins into peptones in alkaline media. It is inactive at 75° C. One part should peptonise about 100 of coagulated egg albumen in 1½ hours.

Soluble slightly in water, more so in glycerin.

It is administered to assist digestion in diabetes, and it is occasionally employed for peptonising milk. It may be given in Formagules. Commercially it contains some Amylopsin. For cancer treatment, *v. infra.*

Preparation. Precipitate an infusion or extract of the pancreas with a large volume of alcohol, dissolve in ice cold water and precipitate again with Absolute Alcohol. Digest the precipitate with Absolute Alcohol, then treat with water; the residue dissolves, consisting principally of Albumin, Trypsin, Tyrosine, and Leucoid (a proteid). Treat the solution with Acetic Acid until this amounts to 1%—this throws out the leucoid. Filter and render slightly alkaline with Sodium Hydroxide and concentrate at not exceeding 40° C. Filter out Tyrosine, which separates. Add Alcohol to the filtrate, which throws out the Trypsin (somewhat impure). It may be purified by repeated solution in water, dialysis, reprecipitation, &c.

For Muller's Trypsin Test for determining the activity of Trypsin Preparations, see Vol. II.

Trypsin Treatment of Malignant Growths.

Hypodermic Injection of Compound Trypsin Solution (*i.e., with Amylopsin*). The injection is made in sound tissue near the growth if possible, otherwise in flank or buttock. *To commence with, the dose is* 15 *minims, then* 20 *and* 30 *minims. At first one injection every alternate day, and later every day.*

Sterules, Hypodermic, contain 30 minims of the Trypsin Solution, also Ⓟ with Cocaine Hydrochloride $\frac{1}{10}$ grain.

In tuberculosis injections of trypsin are said to lessen and even completely stop pain, discharge and night-sweats, with a marked improvement of the appetite.—W. Baetzner, Pr., Jan., 1913.

Glycerinum Trypsini.—A concentrated (10%) Solution for dilution is supplied commercially. In cancer five minims of 1 to 3% Solution, prepared by diluting this with water or Normal Saline is injected. Pancreatin or Tryspin is given concurrently in increasing doses by the mouth, *e.g.*, as **Glycerinum Pancreatis** *q.v.*, or **Liquor Trypsini** in 1 to 2 drachm doses three times a day before meals.

Cachets or Capsules of Trypsin 5 grains each, and **with Ox Gall,** 2 grains (which latter was said to strengthen the action of the Trypsin).

Pigmentum Trypsini (*Syn.* LOTIO PANCREATIS, SURGICAL SOLVENT) for painting on ulcerated surfaces or used in poultices.

Suppositorium Trypsini for use in carcinoma of the rectum.

Trypsin Ovules with Theobroma basis for carcinoma uteri.

Diagnostic value of the **Antitryptic Index** damped by the fact that ‘an increase in the power of the Serum to neutralise the activity of Trypsin is not specific to cancer, but common to many infective diseases.’ A New York investigation states that even the injection of the strongest solutions is not followed by toxic symptoms assignable to products of digestion of tissues. Amelioration of symptoms was as effectually obtained by sterilised distilled water. Trypsin does not cure cancer.—L. ii./09,1079.

✶ **Holadin** (T.M. 300980) Capsules contain an extract of the entire pancreas, said to represent all the constituents both of the digestive and intestinal secretions.

Capsules of Holadin 2½ grains and **Bile Salt** 1½ grains are also supplied.

PAPAIN.

Syn. PAPAYOTIN. *Dose.*—1 to 8 grains (0·06 to 0·5 Gm.).

Whitish, amorphous powder, prepared from the juice of the Papaw, *Carica Papaya* (*Passifloraceæ.*) 75% should be dissolved by absolute alcohol.

Manufacture.—The fruit while remaining on the tree is lightly incised several times at intervals of 2 or 3 days with a bone knife and juice collected in calabashes containing a little water. The juice is rapidly dried—the coagulated milk being exposed to the sun or artificial heat on glass or linen frames at not exceeding 100° F., subsequently while still warm powder in a drug mill.—C.D. i./13,100.

Ceylon Papain said to be better than that from the West Indies. C. Papaya also grows in India, East Indies and the Hawaiian Islands. Papaya Juice has slight escharotic effect—the collectors have the skin of their fingers blistered.

Much sophistication is practised in the manufacture of Papain. Its natural colour is light brown. The bleaching of Papain is a great mistake. The supply from Ceylon is almost unlimited. List of adulterants used, which include bread, starch and the milk of gutta percha and the wild cactus.—P.J. ii./13,530.

The Papaya fruit is ripe before losing its green colour. It is best for production of good Papain though tapping the stem and crushing the leaves also yield Papain.—P.J. ii./13,607.

Papain Adulteration.—Indian adulteration by adding carefully *boiled* rice to extent of 10%—hence difficult to detect.—E. J. Parry, P.M.C.E., C.D. i./13, 562

Papain, its history, botany and commerce.—It is sometimes called the tree melon. It is commonly used as a table fruit in hot countries. The leaves are used for wrapping round fresh meat to render it tender. The juice of the fruit is also rubbed into meat for this purpose or a piece of the fruit is placed in the water in which meat is boiled. A tree bears on an average thirty fruits a year and lasts some 5 years as productive and worth cultivation. A trace of formalin should be added to the juice as collected by scarification. A dozen fruits yield about ½ lb. of dried granulated crude papain at one tapping. Huybertsz found the Ceylon Papain will digest 200 or 300 times its weight of albumen, while West Indian only digests 75.—H. F. MacMillan, C.D., Jan. 30, 1915.

Assay.—Recent examination showed that 0·4 Gm. Papain will peptonise 100 Cc. of 4% Alkaline Casein Solution in 1 hour.

Uses.—As a digestive in chronic cases of dyspepsia with acid eructations and painful gastric fermentation. It acts in acid, alkaline, or neutral media, has the property of digesting fibrin like pepsin (as much as 200 times its weight in some cases).

The Liquid preparations are suitable for use in cases of enlarged tonsils—after persevering treatment, improvement in nasal breathing can be observed—due to reduction of the swellings.

It has the property of curdling milk like rennet and might be used as a substitute for the latter.

Ulcers and fissures of the tongue have been painted with a solution of Papain 1 to 2 in 10 each of glycerin and water. It is a vermifuge destructive to ascarides and tænia.

Elixir Papain.—*Martindale.*

Dose.—1 drachm (4 Cc.) with meals.

Glycerinum Papain.—*Martindale.*

Dose.—1 drachm (4 Cc.) with meals as a digestive.

It has also been used as a pigment for chronic eczema and warts, and has been applied to diphtheritic exudation.

Tabellæ (of chocolate basis) contain 2 grains (0.12 Gm.).

Trochisci ½ grain (0·03 Gm.).

Ⓟ**Trochisci Papain** (⅕ grain) **et Cocainæ** (1/10 grain). These, if slowly sucked, are useful for ulcers, warts or sores on tongue, &c.

P1 **Pilula Papain Composita.**—*G. Ogilvie.*

Dose.—1 with meals. Papain 2 grains, Extracts of Nux Vomica ⅓ grain, Belladonna ⅙ grain, Aloes ¼ grain. A digestive laxative.

Pulvis Papain Compositus. E.L. *Dose.*—5 grains (0·3 Gm.), Papain 1, Sodium Carbonate 2, Sugar 2.

Liquor Papain et Iridin.

Dose.—2 to 4 drachms (8 to 15 Cc.). Papain 120 grains, Iridin 150 grains, Glycerin 2 ounces, Sherry 5 ounces, Chloroform Water to 1 pint. Macerate 7 days and filter.—From Ph. Form., 1911, p. 890 modified.

PARAFFINA.

The Paraffins used in Pharmacy are arranged herein in order of consistency, commencing with the Hard and following in rotation with Soft—vaseline and unctuous compounds, vaseline oils (thick fluids), Liquid Paraffin, and finally the light fractions known as Amyl Hydride, Petroleum Spirit, etc.

Paraffins from a Yorkshire coal seam. Six fractions ranging from 70° to 350° C. were examined.—J.C.S.I., Jan., 1912, p. 12.

Paraffinum Durum.—*Syn.* PARAFFIN WAX.

A mixture of several of the harder members of the paraffin series of hydrocarbons $C_{20}H_{42}$=282·436 to $C_{27}H_{56}$=380·583; obtained, by distilling shale, separation of the liquid oils by refrigeration, and purification of the solid product. Colourless, semi-transparent, crystalline, inodorous, and tasteless, slightly greasy to the touch. Sp. Gr. 0·82 to 0·94. Insoluble in water, slightly soluble in absolute alcohol, soluble about 1 in 80 in ether. It burns with a bright flame, leaving no residue. Hard paraffins are supplied with the following melting points :—100°, 104°, 110°, 115°, 120°, 125°, 127°, 130°, 135° F. (*Off.*). employs from 122° to 140° F.

U.S. has M.pt. 50 to 57° C. (122 to 135°F).

Ceresin. A hard white paraffin prepared from ozokerite or earth wax ; has M.pt. about 130° F. When artificially coloured to resemble yellow wax it is sold as **Yellow Ceresin. Ozokerit** is a hard paraffin obtained from Galician deposits.

Paraffin Solid, Sterilised.

For subcutaneous injection in plastic operations this should be hard paraffin with M. pt. 110—115° F. *not an extempore mixture.* Used to improve the size and shape of the nose, ear, &c., where abnormal, also for injecting into cavities after previously swabbing out with antiseptic Lotion.

The injection should be made in a warm room to allow of the flow of the melted substance through the syringe needle.

In facial surgery.—S. Mort, L. ii./19,105.

Ozæna treated by injecting high melting paraffin into the nasal septum.—B.M.J.E. i./15,36.

Paraffinum Molle (*Off.*).—*Syn.* Petrolatum, U.S. and Petrolatum Album, U.S., Petroleum Jelly.

A white or yellow semi-solid mixture containing some of the softer or more fluid members of the paraffin series of hydrocarbons $C_{15}H_{32}$=212·331 to $C_{20}H_{42}$=282·436. Melts (*Off.*) at 42 to 46° C., or even somewhat higher (U.S. requires 38 to 54° C.). Is usually obtained by purifying the less volatile portions of petroleum.

Soluble in alcohol slightly, freely in ether and chloroform, insoluble in water. When melted, it mixes with oils, and many waxes, oleates, and oleic acid.

Soft paraffin is not readily absorbed, but is emollient, protective and useful for surface action, *e.g.*, for compounding with lead, mercury, zinc, and sulphur iodide.

Intra-articular injections of Vaseline admirable in certain cases of painful and grating joints including morbus coxæ senilis and dry traumatic arthritis. For a knee joint 15 Cc., for the hip 20 to 25 Cc. If the joint contains fluid its further secretion may only be stimulated by injection of Vaseline.—B.M.J.E. ii./13,78.

*** **Vaseline** (T.M. 12486) is a yellow soft Paraffin. This is filtered through animal charcoal, becomes **Vaselinum Album.**

This is the **Vaseline Officinale** or **Pétroléine** of the Fr. Cx.—that which remains over after distilling American Petroleum at 360° C. and purifying. 2 to 5% 'Paraffin' is directed to be added according to season or climate to improve its consistence.

Tests.—It should be pointed out that the B.P. 1914 omits the requirements of the B.P. '98 that Paraffinum Molle shall be "free from acidity, alkalinity, or any unpleasant odour or flavour, even when warmed to 120° F. (48·9° C.)." Vaseline complies with these requirements.

High Melting "Vaseline" is also prepared with M.pt. 46·1° C. (115° F.)., suitable for warm climates.

Unguentum Paraffini made with Hard Paraffin (M.Pt. 54 to 57° C.) 27, Soft Paraffin 70, Beeswax 3, is suitable for use with the atmospheric temperature, 15° C. May be modified to meet the exigencies of climate and temperature

A Hard Paraffin with somewhat low melting point, *e.g.*, 46 to 52° C. is best. Our experiments showed it is well to melt together and set aside to crystallise (or allowed to cool on the water bath) and then mill, rub down, or sieve again.

A small quantity of wool fat added to soft or liquid paraffins enables the production of a stable Emulsion, *vide* Vasenol.

Ceratum Petrolei is a firmer basis than the Soft Paraffin and is a good protective.

White Soft Paraffin 2 parts, Hard Paraffin (135° to 140°) 1 part. and Melt stir until cold in an evaporating dish.

'**Collapsubes**' of Vaseline with catheter and rectal attachments are suitable for uterine and rectal medication. The base may be medicated with antiseptics and astringents ; for formulæ, *vide* Index.

Ceratum, U.S. White Wax 30, Benzoated Lard 70. Melted together and stirred until the cerate congeals. In hot seasons and warm latitudes, White Wax 50 may replace 50 of Benzoated Lard.

Paraffin Teatment of Burns.

Paraffin "No. 7" is made as follows :—

Melt Hard Paraffin 67·75 and add Soft Paraffin 25 and Olive Oil 5. Then mix in carefully Beta-Naphthol 0·25 dissolved in Eucalyptus Oil 2, after the mixture has cooled to about 55° C. (The original mentions Resorcin 0·25 to 1% as alternative and that a small quantity of Absolute Alcohol is to be used as solvent). The finished article melts at about 48° C.

Method of Use.—Wash the burns with sterile water, dry thoroughly for example with a fan and spray or apply the melted preparation carefully with a flat camel hair brush. Cover with a thin layer of wool and a second coating.

Severe burns accompanied by sloughing and in a very septic condition cleaned and became healthy. Cordite, Petrol and Liquid fire burns healed. Also suggested for frost bite.—A. J. Hull, B.M.J. i./17,37. Wounds and Burns treated—nothing so effectual. —E. F. Pratt, B.M.J. i./19,243.

Other formulæ.—No. 10 Red (containing scarlet), No. 12 Brilliant Green, No. 13 Flavine Wax, No. 14 Dichloramine Wax, The No. 7 with preliminary painting of surface of the burn with 1 in 1000 Flavine gives the best results.— A. J. Hull, B.M.J. ii./17,788.

Ambrine T.M. 380347). A similar preparation advised by B. de Sandfort (a compound of Paraffin with 5% Oleum Succini, L. i./17,318). Applied in similar manner.

Results better than those with Picric Acid. Pain alleviated, scar formation prevented. It has elastic and adherent properties.—B.M.J. ii./16,329,333.

Dental Wax. Hard Paraffin 1 ounce ; Beeswax 6 ounces. melt together, add $\frac{1}{2}$ ounce Alkanet and keep warm for two hours, then strain and add Tincture of Tolu 2 drachms, Otto of Rose 5 drops. Generally supplied in sheets $6\frac{1}{2}$ by $3\frac{1}{2}$ inches *Use.*—The sheet is warmed over the flame and moulded carefully over the model. It is used for mechanical purposes prior to vulcanisation.

Vaseline Oil.—*Syn.* LIQUID VASELINE.

Used as a vehicle for **Hypodermic Injections**. For the suspension of in soluble mercurial salts. such as calomel. salicylate, succinimide, benzoate and yellow oxide of mercury. 1. 5. or 10% mixtures being employed.

Oleum Petrolei Flavum is a commercial article of similar consistence.

Huiles Lourdes de Petrole.

Heavy Petroleum Oils—products from American Petroleum. Distilling between 280 and 400° C. Sp. Gr. 0·880 to 0·905,

Vaselin Oil, 'Vaseline Liquide' Fr. Cx. is prepared from Caucasian Petroleum by purifying the fractions between 335° and 440° C. Sp. Gr. about 0·875 *i.e.* it approximates *Paraffinum Liquidum* in character. Employed in Huile Grise *q.v.*

Paraffinum Liquidum (*Off.*).—*Syn.* OLEUM PETROLEI, PETROLATUM LIQUIDUM, U.S. CHRISMALINE, ✱Paroleine (T.M. 248370).

Dose.—2 to 4 drachms (8 to 15 Cc.).

A clear oily liquid obtained from petroleum after the more volatile portions have been removed by distillation. Sp. Gr. 0·860 to 0·890 (*Off.* For spraying as also for 'Toilet Paraffin' is preferred with gravity 0·865 to 0·870). *For internal use* 0·880 *to* 0·885 *is preferred.* Below 0·880 it is not suitable as an internal lubricant. U.S. has now two varieties,—one termed Heavy, the other Light Liquid Petrolatum—with different viscosities. (We deal further with the question of viscosity in *Vol. II.*).

Russian Oil contains principally Saturated Hydrocarbons while **American** petroleum contains a large proportion of the unsaturated Olefines. The Baku Oils differ from Pennsylvania and other U.S. Oils in consisting largely of hydrocarbons of the Naphthene group. (Saturated single link *ring* compounds). American oils are best for chlorinating. *c.f.* p. 63.

✱**Russolax** (Design Regtd.). is distilled and refined in England. It has consistently high viscosity (275 seconds at 100° F.

Uses.—Liquid and Soft Paraffin have been recently much employed as electuaries or lubricants in constipation. Also of use for colitis in children internally. By its lubricating action there is a probability that, taken regularly, it may avert appendicitis.

Enteric with constipation in Egypt well treated.—L.ii./14,231,421.

It is used as a basis for laryngeal and nasal spray solutions or pigments, containing menthol (1 in 8 or more), cocaine (soluble only 1%) or other medicaments. *Alkaloidal bases and their salts are in general only very slightly soluble in any of these liquid paraffins.* A little Oleic Acid added assists solution.

Emulsio Petrolei cum Hypophosphitibus. *Martindale.*

Dose.—1 to 4 drachms (4 to 15 Cc.).

Some experiments conducted by us in 1907, with a view to making a satisfactory 50% Emulsion, gave the following as the best of a number tried.—Rub Powdered Gum Acacia (good) 4 ounces with Liquid Paraffin 8 ounces, Soft White Paraffin 2 ounces, Cinnamon Oil 24 minims. Then add in 2 portions a solution of Sodium and Calcium Hypophosphites of each 192 grains, Saccharin Elixir 90 minims in Water 10 ounces.

Equal parts of Liquid and Soft Paraffin produce a thicker emulsion.

Emulsio Paraffini cum Pancreatino.

Dose.—2 to 4 drachms (8 to 15 Cc.).

Liquor Pancreaticus 2 ounces included in this formula.

For the intestinal stasis of tuberculous children drachm doses of a preparation of this nature promote healthy function of the bowel.—Pr., Jan. 1913, 281.

Emulsio Paraffini et Bismuthi.

Dose.—One ounce (30 Cc.) first thing in the morning and at bedtime, followed by ⅔ tumblerful of moderately hot water.

Liquid Paraffin 1 ounce, Clove Oil 10 minims, Sodium Bicarbonate and Compound Tragacanth Powder of each 1 drachm. Emulsify with Chloroform Water ½ ounce, and Solution of Bismuth 1 drachm and add in portions Chloroform Water to 8 ounces.

The small dose of Bismuth is intentional. In some cases larger quantities may prove constipating.

The formula is varied to suit the case, *e.g.*, Peppermint Oil 10 minims may replace the Clove Oil, varying doses of Bismuth Salicylate, or Subgallate, may replace the Bismuth Solution, and where there is constipation Vinum Aloes or Compound Tincture of Aloes ½ ounce to 1½ ounces may be incorporated.

Catarrh of the alimentary tract is frequently responsible for toxæmia due to insufficient or impeded action of the liver and pancreas. This condition is often the cause of affections of the circulatory system (heart troubles, etc.), coupled with evidence of rheumatoid arthritis and of fibrositis.—W. Bezly Thorne—"Discussion on Alimentary Toxæmia."—P.R.S.M., Vol. VI., No. 7, May, 1913, pp. 261–265.—L. i./13,1384.

Milk Casein as emulsifying agent for Paraffin Emulsions.—P.J. ii./13,208.

The following are flavoured preparations :—

Aperfine Liquid. *Dose.*—2 to 4 drachms (8 to 15 Cc.). Liquid Paraffin flavoured with oil of Lemon.

Aperfine. *Dose.*—2 to 4 drachms (8 to 15 Gm.) is similar but in paste form. It contains 70% of White Soft Paraffin.

These act purely physically, hence produce no evil effect or habit.

The following are some other Paraffin preparations on the market :

∗**Aperol** (T.M. 290001). **Appendicol.** **Aquol.** **Atoleine.** **Delectol.** ∗**Deliciol** (T.M. 347394). ∗**Fossiline** (T.M. 25358). **Internol.** ∗**Jellax** (T.M. 358281). ∗**Petrojel** (T.M. 274384).

Osacol (T.M. 365487) **Jelly** contains 75% Russian Paraffin in a Malt Extract basis.

Fructolax. *Dose.*—2 to 3 drachms at bedtime. A lenitive and laxative containing about 80% soft Hydrocarbon with a fruit conserve. For internal use.—L. i./13,328.

∗**Laxamel** (T.M 355661). *Dose.*—1 to 4 drachms (4 to 15 Cc.). A jelly containing 80% Paroleine.

Emulsio Paraffini cum Rhamno Frangula.

Dose.—½ to 1 ounce (15 to 30 Cc.)

Liquid Extract of Buckthorn Bark 1 ounce, Liquid Paraffin 4 ounces, Benzoic Acid 5 grains, Irish Moss Decoction to 8 ounces. A mild laxative.

∗Paraffagar (T.M. 355918).

A combination of Hydrocarbon Oil with Agar Agar as an antiseptic electuary, which cannot have a weakening effect upon the system.

Dose.—1 to 2 drachms at bedtime. Children, ½ to 1 drachm increased if necessary.

✱**Maltaffin** (T.M. 355917).—A paraffin and malt preparation is described, p. 533.

✱**Semprolin** (T.M. 353942) **Emulsion.**—For use as a lubricant to the alimentary and intestinal tract. Contains 60% Liquid Paraffin. Combinations with Bismuth and Pepsin, Glycerophosphates, Hypophosphites, Iron, Lecithin, Guaiacol, Malt, Salol, etc., are made. Semprolin Cream containing 90% Liquid Paraffin and Semprolin Carminative are also prepared.

Given as a lubricant Liquid Paraffin enters the cæcum mixed with the iliac contents and keeps the contents of the large bowel soft. In addition it accelerates the passage of the fæces through the large intestine which consequently does not become overloaded. The whole of the ingested Paraffin can be recovered from the stools,—there is no toxic action even with large amounts. Sir W. A. Lane was the first to popularise Paraffin for internal use.—J. W. Peck, P.J. i./14,28,508.

Liquid Paraffin should be *non-fluorescent.* For intestinal stasis Paraffin is an ideal remedy, but Sir W. Arbuthnot Lane cautions against the use of the lighter oil, which is used so extensively for sprays in nose and throat work.—Am. Jl. Ph., July, 1914,327.

For a large number of references to its early use as a lubricant see Edn. XVI., p. 596.

Viscosity of Paraffin see Vol. II.

Liquid Paraffin is a good catheter lubricant.

In a case of recurrent generalised eczema madidans local use of Liquid Paraffin effective.—B.M.J. ii./13,1013.

Ⓟ**Paraffinum Compositum Liquidum.** CAN. FORM.

Mix the following intimately, to make a homogeneous liquid. Camphor 3·4, Menthol 1·0, Thymol 0·5, Eucalyptol 1·0, Oil of Wintergreen 3·4, Hydrastine 0·015, and Liquid Paraffin a sufficiency to make 1,000. Is suitable for use as an antiseptic and astringent 'Nebula.'

Nasal passages and throat should be kept clean with a simple oily preparation, *e.g.*, Liquid Paraffin, as they are frequently the paths of infection, for pneumonia, rheumatic fever, influenza and diphtheria, also for cerebro-spinal fever and poliomyelitis.—Sir James Barr, B.M.J. i./11,1359.

Capsules (Gelatin) with pointed ends of **Sterile Liquid Paraffin** are made for lubricating catheters, &c.; they contain 30 minims.

Wound Dressing with Liquid Paraffin.

At one stage in the war there was considerable enthusiasm for 'Oil' preparations as wound dressings and there is no doubt that a simple dressing of this kind could be used with advantage to many uncomplicated wounds.

Casualty Clearing Station results show success with Liquid Paraffin preparations. Gauze used for packing a wound smeared with a Paraffin Paste should be wrung out of Liquid Paraffin or Iodoform-Paraffin 1%.—Col. H. M. W. Gray, B.M.J. ii./17,509. *See also* Iodine in Paraffin.

Gauze soaked in paraffin—Liquid or Soft Paraffin—useful to wounds.—J. Campbell, L. ii./18,477,495.

CREOSOTED OIL. (Calot's formula). Liquid Paraffin 70 Gm., sterilised by boiling for ½ hour. Allow to cool and add in order (1) Creosote 5 Gm., (2) Guaiacol 1 Gm., (3) Iodoform (sterile) 10 Gm., (4) Ether 30 Gm.

Used as a wound dressing. A somewhat similar formula has been used for injection into tubercular sinuses.

The various **Lubricating** and **Lighting Oils**, *e.g.* **Kerosene-fractions** between 120° and 133° C., and **Mineral Naphtha** (to be distinguished from Solvent Naphtha *q.v.*), are the next fractions, and are mentioned here to render the series more complete.

Laryngeal diphtheria well treated by ordinary petroleum oil (Kerosene)—(taste being covered with compound sarsaparilla decoction) in thirty minim doses on three successive days every four hours reduced subsequently. Breathing became easier. Claimed to have potentialities in other diseases.—T. M. Clayton, B.M.J. i./15,208; P.J. i./15,241.

(NOTE.—During the war and probably since—the benzol, toluol and xylol fractions were removed from mineral naphtha in great measure thus producing a liquid with much higher boiling point.—Abel Scholar C.D.).

Lefroy's Crude Mineral Oil Emulsion. *Syn.* **Petroleum Insecticide.** Crude Mineral Oil (Kerosene) 110, Soft Soap 50 (whale oil soap is specified) with about 10 of water to form a jelly. For use against lice, fleas, flies, etc.—both destroying them, preventing their further attack and thereby acting as a prophylactic to many forms of infectious disease—typhus, typhoid, diphtheria, diarrhœa, dysentery, consumption, etc. It is used like ordinary soap for washing. If a little be allowed to dry into the clothes vermin will not approach. The same effect is secured by rubbing a little over the skin.—H. Maxwell-Lefroy, L. i./15,1150.

***Vermijelli** (T.M. 365780). A preparation originally devised for spraying plants after dilution. The following is similar:—Whale Oil Soap 160, Crude Petroleum 110, Naphthalene 4.—H. M. Lefroy, B.M.J. i./15,317. Preparations of this kind in conjunction with 'N.C.I.' (*q.v.*), have been much used in the war.

Favus cured in less than a month by soaking with the Petroleum of commerce.—B.M.J. i./09,1297.

Petroleum Burning Oil may be rendered smokeless by shaking with seawater containing proportion of vinegar.—Patent.—P.J. ii./10,685.

Huile de Petrole, FR. CX. has Sp. Gr. 0·800 distilling between 130° and 180° C. from American Petroleum. Flash point not lower than 35°.

'**Petrol**' and **Petrol Tests,** *see Vol. II.*

For wounds, swabbing out with Petrol gave good results.—M. H. Embree, B.M.J. ii./16,327.

Petrol Poisoning resembles drunkenness. Treatment: little to be done beyond placing patient in fresh air and keeping him warm.—B.M.J. i./15,769.

Petroleum Benzine or **Benzoline** is the fraction between 60° and 90° C. This is used for cleaning purposes. Distinguished from Benzene (Benzol), the product obtained from Coal Tar, *q.v.*

Petroleum Spirit. *Syn.* PETROLEUM ETHER ***used for heating cauteries.*** Has Sp. Gr. 0·67 to 0·7, and distils over below 60° C. $C_5H_{12}=72·121$ principally.

Benzinum Purificatum U S. is Purified Petroleum Benzine with Sp. Gr. 0·638 to 0·660 at 25° C. and B. pt. 40 to 80° C.

Benzine (preferably spelt Benzin) means Petroleum Benzin.

Petroleinum, P. Belg. and **P. Jap.** have Sp. Gr. 0·64 to 0·67 with B. pt. 50° to 75° C. FR. CX. has with *Syn.* **Gazoline,** Sp. Gr. 0·65 to 0·67, and to distil over entirely below 85° C. **Ligroin** is a very similar product.

Petroleum Spirit.—With Sp. Gr. 0·640 contains always a large fraction boiling below 40° C., and with Sp. Gr. 0·700 contains a large amount distilling above 60° C.—Tyrer and Gosling, P.J. ii./12,157.

Pétrole léger. FR. CX. has Sp. Gr. about 0·6, and distils entirely below 50° C.

Amyl Hydride. *Syn.* PENTYL HYDRIDE; PENTYLENE; HYDRAMYL. Mainly $C_5H_{12}=72·121$. Obtained by the fractional distillation of Petroleum Spirit. Sp. Gr. 0·625 to 0·649, boiling point about 30° C. It is very inflammable; applied locally, is not absorbed, but rapidly freezes the part by evaporation. **Rhigolene** is similar.

Poisoning by Petroleum Benzin treated with Camphor injections and oxygen inhalation.—B.M.J. ii./09,5.

Oleogen contains Oleic Acid, Yellow Petroleum Oil, with a proportion of Ammonia. A clear yellow oily preparation. Sp. Gr. 0·91. It is miscible with Chloroform in all proportions.

Medicated Oleogens of the following are prepared:—

Camphor, 30% Rubefacient. **Guaiacol,** 20% Antituberculous. **Ichthyol,** 10% Antiseptic. **Iodine,** 5 and 10% Antisyphilitic. In tinnitus aurium should prove of value—a few drops to be rubbed extensively behind the ear night and morning. **Menthol,** 2% Rubefacient. Antineuralgic. **Salicylic,** 10%, Antirheumatic.

Vasenol. An emulsion of Soft Paraffin and Spermaceti, containing Soft Paraffin 28 ounces, Cetaceum ½ounce, Water 8 ounces. Forms a useful ointment basis. Mixes with water forming a neutral emulsion. It is readily absorbed.

Vasogen.

Stated to be a partly oxygenated mineral oil and to consist mainly of hydrocarbons. *Liquid Vasogen preparations* are made containing Creosote 20%, Guaiacol 10%, Ichthyol 10%, Iodine 6 and 10%, Menthol 2%, Salicylic 10%, Sulphur 3% (Vasothion), and other substances for skin medication.

In phthisis Vasogen Iodi has been advised in 3 minim doses up to 30 minims *t.d.*

Mercury Vasogen 33% and 50% in capsules containing 3 Gm. are used for medication in syphilis.

✱**Valsol** (T.M. 199156) is a liquid preparation on similar lines.

Petroxolins medicated with:—

Chloroform-Camphor of each 25%. **Oil of Cade** 25%. **Creosote** 20% **Eucalyptol** 20% and other compounds are similar.—G. M. Beringer, Am. Jl. Ph., 1911 p. 213; P.J. i./11,657.

Lotio Paraffini Composita. Gt. Orm. H.

Soft Paraffin 3 ounces, Balsam of Peru 2 drachms, Mercuric Oleate 60 grains, Olive Oil 1½ ounces. To be applied with a stiff brush. For parasitic skin diseases.

PELLETIERINA.

$C_8H_{15}NO = 141{\cdot}17.$

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

A mixture of alkaloids obtained from pomegranate stem and root bark, *Punica Granatum* (B.P. 1898), ('Granatum' U.S.) (*Lythraceæ*), in minute shining white crystals. The alkaloids are at least four in number, their amount varies between 0·5 and 0·7%. In addition 20% Tannin.

Estimation (volumetric and gravimetric) of alkaloids in.—P.J. ii./05,580. Punica granatum, history of.—Am. Jl. Ph. 1911, 211.

Fluidextractum Granati, U.S.

Average dose.—30 minims (2 Cc.). 1=1. A glycero-hydroalcoholic extractive.

Pelletierinæ Sulphas, **Punicine Sulphate.** (Fr. Cx.).
$(C_8H_{15}NO)_2H_2SO_4$=380·416.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

A brown syrupy liquid, freely soluble in water, sometimes as crystalline mass. As a remedy for tape-worm : 5 to 8 grains taken fasting, followed by a full dose of compound tincture of jalap ; for 13 years, half the above dose, and for infants one-tenth.

Fr. Cx. provides complete method of manufacture from the pomegranate root bark. In the final stage of extraction the combined pelletierine and isopelletierine are present as sulphates in aqueous solution which on slow evaporation yield a 'crystalline residue' of the two salts. The mixture is called 'Pelletierine Sulphate' for short. The dose is usually **0·3 Gm.** with **0·4 Gm.** of Tannin and **2·5 Gm.** of Syrup. Max. single dose is **0·4 Gm.**

Pelletierinæ Tannas, *Off.*

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

A mixture of the Tannates of the Alkaloids in greyish powder only slightly soluble in water, but soluble about 1 in 80 of alcohol 90%. As a tæniafuge, 8 grains followed in 2 hours by an ounce of castor oil proved an effectual dose, causing neither colic nor headache.

The **Hydrobromide** with same dose is a brownish viscid liquid.

PEPSINUM.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) either with or immediately before or after meals, in a pill or cachet. It is not unpalatable sprinkled on meat like pepper.

The gastric juice of man is believed to contain two distinct digestive ferments :—

a. Pepsin. This changes protein (fibrin, albumen, &c.) into peptones in an acid medium, 0·2% of Hydrochloric Acid being the most advantageous. To this the medicinal pepsins owe their activity.

b. Curdling ferment, which curdles the casein of milk ; this is very active in the stomach of the calf, and will permit of its being dried ; it is contained in the preparations of rennet preserved with salt, known as :—

Essence of Rennet. *Syn.* **Liquor Seriparus,** Liquid Rennet.

Dissolve Sodium Chloride 40 in water 810, add Alcohol 190 and macerate Rennet (calf's stomach) 100 in the mixture for three days with frequent agitation, then filter.—N.F., Ph. Form. gives three other formulæ—one with Glycerin and Boric Acid as preservatives.

Rennet can clot 400,000 times its weight of Casein in Milk.—C.D. '19, 543.

Rennin. Rennet Ferment in powder form. One grain dissolved in about ½ ounce of water will in an hour or two curdle a pint of milk under ordinary conditions. (To be kept at blood heat.)

Rennet Tablets are prepared and are of considerable convenience. One will curdle a quart of milk.

Pepsin may be used in cheese-making instead of rennet. It is impossible to detect any difference between cheese made with pepsin and that made with rennet. The pepsin solution is :

Sodium Chloride 2 lbs., Boric Acid 3 ozs., Water 1 gallon.

Dissolve by boiling, then cool to 104° F., and add Pepsin 13½ ozs.—C.D. ii./17,761.

Pepsin is a light yellowish brown or white powder, or in translucent grains or scales, preparedby drying under 100° F. the fresh mucous lining of the stomach of the pig, sheep, or calf. It has a faint, not disagreeable odour, is moderately soluble in water. Rubbed with water, it makes a glairy mixture. Pepsina Porci is generally preferred. Pepsin is supplied to dissolve 2,500 (*Off.*), 3,000 (U.S.), and 5,000 times its weight of freshly coagulated and disintegrated white of egg.

For various other Assay methods see Vol. II.

Incompatibility of certain Chemicals and Drugs with the action of Pepsin :—

Our experiments have shown that broadly speaking inhibition of peptic activity depends on concentration of the diluent fluid.

As enzymes form colloidal solutions the presence of any electrolyte has a *decided influence.* A *small* quantity of electrolyte seems essential to enzyme action. Salts present *in any quantity* hinder the enzyme.

Amongst the Substances *preventing action* if present in strong proportion may be mentioned :—

- Alcohol,
- Alkalis,
- Alum,
- Copper Sulphate,
- Extract of Malt,
- Magnesii Sulphas,
- Paraldehydum,
- Potassium Salts (Chloride, Bromide, Iodide),
- Sodium Chloride,
- Hexamethylenetetramine.

For full details see Vol. II.

Asbestos has the effect of removing Pepsin and other ferments from Solutions.—B.M.J. i./13,1376. *c.f.* our p. 137.

Aluminium Hydroxide has the same power.—J.C.S.A. i./13,779.

Flavoring.—Syl Lavandulæ, Syl Coriandri, or as Elixir Pepticus.

Soluble and Insoluble Pepsins (Commercial).

Insoluble Pepsins are of two kinds, one precipitated by salt, and one made directly from the selected membranes without digestion, but purified by washing in spirit. These require a small quantity of Hydrochloric Acid to effect solution in water.

Soluble Pepsin is made by self-digestion of the membranes and subsequent dialysis of the resulting Peptone, thus leaving the peptic power in a soluble and more isolated form. It is then dried on glass plates, being sold in scale or powder form.

In sprue and hill diarrhœa with good results.—B.M.J. ii./05,1519.

In vomiting due to utero-gestation, pepsin in dose of 7 to 8 grains has been advocated as of service.—Yeo.

Glycerinum Pepsini (*Off.*).

Dose.—1 to 2 drachms (4 to 8 Cc.) in water.

A solution of Pepsin 8% strength in Acidulated Glycerin and water. This is a very active solution. B.P. '98 differed slightly. If made with good scale Pepsin keeps indefinitely.

Contused wounds if sloughing is suspected should, it is suggested, be treated with glycerin of Pepsin. *See* Wounds.

Elixir Pepticus. *Dose.*—½ ounce after each meal.

Glycerin of Pepsin 8, Dilute Hydrochloric Acid 1, Aromatic Syrup to 32.

Liquor Pepticus (Benger's).

Dose.—1 to 2 drachms (4 to 8 Cc.) in a wineglassful of water with meals. An active solution of the ferments in weak alcohol.

Liquor Pepsini et Caffeinæ. *Martindale.*

Dose.—2 to 4 drachms in water after meals.

The above dose contains 5 to 10 grains of Pepsin with 1 to 2 grains of Caffeine. As a digestive and restorative. The presence of Caffeine is stated to increase the activity of Pepsin.

ⓅElixir Pepsini Bismuthi et Strychninæ.

Dose.—1 drachm (=Pepsin ½ grain, Bismuth and Sodium Tartrate 2 grains, Strychnine $\frac{1}{64}$ grain).

Dissolve Scale Pepsin 64 grains in Glycerin 1 ounce, Water 1 ounce, mixed. Dissolve separately Strychnine 2 grains in Tartaric Acid 2 grains, Water 3 ounces and add Glycerin 1 ounce. Then mix with Glycerole of Bismuth and Sodium Tartrate 2 ounces, and add Aromatic Elixir 8 ounces, and Caramel 4 drops. Finally, pour the Pepsin Solution first prepared into the other liquid.

To prepare the **Glycerole of Bismuth and Sodium Tartrate,** dissolve Bismuth Subnitrate 1,142 grains in Nitric Acid 19 drachms, previously diluted with Water 10 drachms. Then add in parts, Water 16 ounces. Add Tartaric Acid 860 grains, and then gradually Sodium Bicarbonate 977 grains, Dilute the Bismuth Tartrate formed with Water 32 ounces. Allow to deposit, and wash repeatedly until free from Nitric Acid. Mix Sodium Bicarbonate 977 grains with Water 5 ounces, and add cautiously Tartaric Acid 860 grains, warming slightly to dissolve. Dissolve the Bismuth precipitate in this Solution, add Glycerin 8 ounces. Evaporate or dilute with Water if necessary to 16 ounces. Each drachm contains 16 grains of Bismuth and Sodium Tartrate with excess of Sodium Tartrate.—Caspari. Looks better coloured pink.—W.H.M.

Peptone.

A whitish powder, prepared from meat (the proteins and albuminoids), peptonised either by acidulation and heat under pressure, or by artificial digestion with pepsin or trypsin, and freed from saline matter. It is soluble in water, and is used for culture media and as a bile test (*q.v.*).

Peptone Injection. *Dose.*—**5 to 10 Cc.**

Bronchial asthma. Immunisation by subcutaneous injection of a solution of Peptone. *Armour's "Ordinary"* Peptone ⅓ Gm. in 5 Cc. of distilled water given at blood heat at interval of 3 or 4 days during the first week. Next week 2 injections of ⅔ Gm. and in the next 1 Gm. in 7 to 10 Cc. More severe cases may require 1 Gm. weekly or bi-weekly for 3 weeks more. Symptoms became quiescent in some; in others great benefit. The asthmatic attack is thought to be a reaction on the part of the lungs to a toxic substance which gradually accumulates in the blood. The particular protein poison is unknown.—A. G. Auld, B.M.J. i./17,580. The method was subsequently altered in the following communication.

The content of primary proteoses is the deciding factor in this method of treating asthma. The content varies considerably—Witte's contained more than twice as much as *Armour's "Ordinary"* Peptone. A 2% of Witte's or a 5% of this ordinary Peptone is employed. To a solution of either made at 37° C. in Normal Saline—¾ of the total volume required, 1 Cc. of 2% Sodium Carbonate Solution for each ⅓ Gm. of Peptone is added and the solution finally made up to volume with Normal Saline with the addition of 0·25% Phenol.

The *initial dose* is generally 0·3 Cc. (5 minims). Increase by 0·2 Cc. every fifth day until ten injections have been given. Three or four more injections of the same as the last are to follow.

The injection is given ***intr venously slowly*** in the arm, no after dressing being necessary. Subcutaneous injections may produce pain and swelling.

To *test* a Peptone: add an equal volume of saturated aqueous Ammonium Sulphate Solution to a 10% solution of the Peptone and stir with a glass rod. If satisfactory, a sticky precipitate comes down in abundance which adheres to the rod.—A. G. Auld, B.M.J. ii./18,49.

A *third* paper by the same authority (B.M.J. Apl. 24/20) reviews results obtained. One group of cases responds quickly, the other is resistant. In the first, children are specially included. The dose in this case is made into the spinal muscles. Witte's Peptone must not be used. Give the same dose as intravenously for adult but double concentration.

Peptonised Beef.

A chocolate-coloured paste, having a bitter taste and the odour of extract of beef; prepared by artificially digesting beef by means of acidified fresh gastric juice and concentrating the solution. It is sometimes added to beef tea, but is too unpleasantly bitter to be readily taken by patients. Enemata and suppositories, *v. infra.*

Peptone F.E. is manufactured by digesting 1 kilo of beef with 10 litres of water (containing 4 Gm. of hydrochloric acid per litre) with pepsin 10 Gm. for 8 hours at 50° with frequent shaking. Termination of reaction shown by absence of precipitate with nitric acid on adding to a little of the filtered liquid. Evaporate. 1 kilo yields 250 Gm. approximately.

Peptonised Beef Suppositories.

Contain 30 grains of the Peptonised Beef. The value of this method of feeding has been questioned. *c.f.* Enema Nutriens.

Peptonoids of Beef (Gerrard).

Lean Beef, finely minced, 8 ounces, Pancreatin 60 grains, Sodium Bicarbonate 60 grains, Water 1 pint. Digest 3 hours at 130° F. with constant stirring; neutralise with hydrochloric acid, boil, strain and press. As enema 1 ounce with normal saline 3 ounces, *p.r.n.*

The proprietary article, **Carnrick's Liquid Peptonoids**—'Beef, Milk and Wheat' is a predigested food. *Dose.*—$\frac{1}{2}$ tablespoonful at intervals. May be dispensed by registered chemists without requiring a spirit licence to be taken out, providing it forms a constituent of a *bona-fide* medical prescription given by a duly qualified medical practitioner. Also applies to **Panopepton.**—P.J. i./11,568.

Beef Peptone with Malt.

Dose.—2 to 4 drachms. A palatable nutrient.

Tabellæ Pepsini. *Dose.*—1 or 2 just before or with meals.

These have 3 grains of pepsin in each in combination with chocolate, they are palatable—a handy form of providing the digestive.

Tabellæ Pepsini et Bismuthi. *Dose.*—1 or 2 just before or with meals,—contain 3 grains bismuth oxynitrate added to the above.

Tablets of Pepsin, compressed, 3 grains (**0·2 Gm.**).

Tabellæ Pepsini et Caffeinæ.

Contain 3 grains Pepsin with 2 grains Caffeine. *Dose.*—1 to 2 after a meal. Digestive and tonic.

Tabellæ Pepsini et Strychninæ. *Dose.*—1 or 2 after a meal. Contain Pepsin, 2 grains, with Strychnine Hydrochloride $\frac{1}{100}$ grain.

Vinum Pepsinæ.

Dose.—1 to 2 drachms with meals.

U.C.H. has Pepsin 3, Diluted Hydrochloric Acid 3, Sherry 60, macerate 2 days and filter.

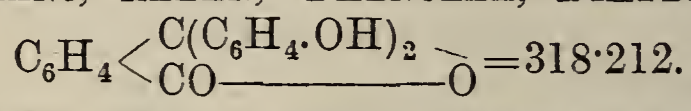
NOTE.—For sale without a Wine Licence in the United Kingdom, *Pepsin Wines must contain 1 of Hydrochloric Acid (B.P.) in 80 of the total product.*

* **Ingluvin** (T.M. 48213.) *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**) is a special Pepsin said to be prepared from the gizzard of the fowl ; it has been chiefly used to allay the sickness of pregnancy.

*"ENZYMOL" (T.M. 233020). A proprietary described as an "Extract of the Gastric Gland." Used externally dissolves septic matter, pus and dead tissues, removes offensive odours and acts as a stimulant to the part. Suggested for affections of the aural and nasal cavities and for dissolving coagula in the bladder.

PHENOLPHTHALEINUM (*Off.*). U.S.

Syn. *PURGEN (T.M. 243986), *LAXOIN (T.M. 253802), LAXATOL, LAXANS, LAXEN, PHENOLAX, DIHYDROXYPHTHALOPHENON.



$$C_6H_4<\begin{matrix}C(C_6H_4.OH)_2\\ CO\text{———————}O\end{matrix}=318{\cdot}212.$$

Dose (*Off.*).—2 to 5 grains (**0·12 to 0·3 Gm.**), but larger doses are given.

A crystalline substance M.pt. 250 to 253° C. made by interaction of Phenol and Phthalic Anhydride. Soluble 1 in 10 of alcohol 90%, but only 1 in 600 of water.

Uses.—As a purgative. Ordinarily ½ to 3 grains is sufficient, but patients confined to bed require from 3 to 10 grains. Does not irritate the kidneys. Is satisfactory for prompt action, as in jaundice.

May cause piles to bleed.—B.M.J. i./05,302.

Effect often is very sudden to the discomfort of the patient. —Pres. August, 1915,160.

1000 doses. Singularly painless. Should not be given in tablet form unless mixed with chocolate. Usually given in 1½ grain doses repeated from 2 to 3 times a day. More active than Cascara and less griping. In intestinal toxæmia ideal.—J. C. McWalter, L.ii./15,1141.

Phenolphthalein Tablets, ½, 2, and 4 gr. are made.

Under the name "Purgen," is supplied as "Infants" containing Purgen ¾ gr., "Adults' Purgen" 1½ gr., and "Strong Purgen" 7½ gr.

Ⓟ**Tablets Phenolphthalein Compound.**

Phenolphthalein 1 grain, Strychnine Hydrochloride $\frac{1}{250}$ grain, Belladonna Extract (*Off.*), $\frac{1}{100}$ grain. A useful combination.

Tabellæ Phenolphthalein with Chocolate Basis are made ½, 2 and 4 grains.

Tabellæ Phenolphthalein (4 grains) **cum Extracto Rhei** (3 grains), form a useful combination.

Phenolax Wafers contain Phenolphthalein 1 grain, Aromatics and Sugar *q.s.*, to 5 grains. They are divisible into halves to facilitate dose.

Phenolphthalein Valerianate. ***Aperitol** (T.M. 301605/1908). PATENT 27,095/1908 lapsed in 1913.

Directs to prepare Phenolphthalein di-isovalerianate by heating phenolphthalein 5 with isovalerylbromide 6 on a water bath until generation of HBr ceases. Dissolve the product in Benzene and shake with Dilute Soda Solution. Evaporate the benzene solution and recrystallise from alcohol.

We would suggest condensing Phenolphthalein with iso-valerianic anhydride in the presence of fused sodium acetate. It would be of interest to heat equimolecular proportions of Phenolphthalein and the valerianic anhydride $(C_5H_9O_2)_2O$ = 218·194 with an excess of Sodium Acetate and extract with alcohol or other suitable solvent.

Dose, children 1½ grains (**0·1 Gm.**) adult 6 grains (**0·4 Gm.**) increased. A mixture of equal parts Valeryl and Acetyl-phenolphthalein has been supplied in Tablet form.

Effervescent Phenolphthalein.

Dose.—One to two teaspoonsful in half a tumbler of warm water a good half hour before breakfast. Contains 3 grains per drachm. A satisfactory mild laxative taken first thing in the morning.

Phenol Sulphon-phthalein, employed as a test for permeability of the kidney. *See Vol. II.*

Fluorescein.—Tetraoxyphthalophenon Anhydride.

Resorcin-phthalein Anhydride. $C_{20}H_{12}O_5$ = 332·196.

In yellowish red powder, *sparingly* ***soluble*** in water, more so in presence of an alkali, *e.g.*, Sodium Hydroxide, forming **Sodium Fluorescein** *Syn.* **Uranin**; showing a most intense green fluorescence.

For use as an indicator in acidimetry (suitable for Ammonia). Prepare Solution of the fresh dye 0·4 Gm. in Alcohol 90% 50 Cc. and add Water 30 Cc. Stand the flask on black ground, using 5 to 10 drops.

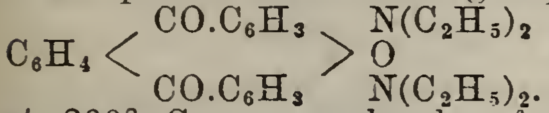
May be used as proof of death by injection.—P.J. ii./11,436.

Liquor Fluoresceinæ, R.O.H. Fluorescein 2 and Sodium Bicarbonate 3 in 100. Useful to diagnose corneal lesions. The ulcers and parts denuded of epithelium take a green colour, which persists for 2 or 3 hours. Loss of substance in conjunctiva is denoted by a yellow colouration.—L. i./91,447.

'**Sterules**' of the solution are cleanly in use.

The **Rhodamines** have remarkable tinctorial power—the red dye classed as 'G extra' especially. The colour in a milligram of a solution containing 0·000,000,000,0001 Gm. is discernible.—L. i./13,184.

A representative of the group of Rhodamines is



$C_6H_4 < \begin{matrix} CO.C_6H_3 \\ \\ CO.C_6H_3 \end{matrix} > \begin{matrix} N(C_2H_5)_2 \\ O \\ N(C_2H_5)_2. \end{matrix}$ which is obtained by heating for several hours at 200° C. one molecule of Phthalic Anhydride with two molecules of Diethyl-m-amido-phenol.

PHOSPHORUS. (*Off*), U.S.

P=31·04.

Dose.—$\frac{1}{100}$ to $\frac{1}{20}$ grain (**0·0006 to 0·003 Gm.**). Max. single dose (*Off.*) $\frac{1}{25}$ grain, Fr. Cx. $\frac{1}{64}$ grain. Max. during 24 hours $\frac{1}{32}$ grain approx.

Manufacture—

Phosphorus is obtained by converting Calcium Phosphate (of bones) into the soluble Superphosphate by heating with Sulphuric Acid; this is reduced to metaphosphate by heating with charcoal and finally by further heat is converted into normal Calcium Phosphate with evolution of vaporised Phosphorus.

A poisonous, non-metallic element melting at 110° F., igniting at a slightly greater heat, and forming white fumes of phosphoric anhydride.

German Shells contained Phosphorus, yellow and red.—B.M.J.i./15,259. Capable of producing localised gangrene and anaerobic bacterial infection more barbarous than expanding bullets. We had occasion to examine a shell of this kind ourselves—it consisted of the red variety

Antidotes.—The best is Oil of Turpentine, especially French variety (from *Pinus maritima*) 30 minims every half-hour; also Potassium Permanganate 1% solution *per os*, Hydrogen Peroxide Solution, Magnesium Sulphate $\frac{1}{2}$ ounce. Copper Sulphate 3 grain doses, *see* List of Poisons.

Inject normal saline solution and give alkalies as soon as the vomiting and purging subside.

Soluble about 1 in 320 of absolute alcohol, about 1 in 200 of ether, about 1 in 25 of chloroform, about 1 in 100 each of oleic acid, almond, olive, castor, theobroma oil, and suet; in half its weight of carbon bisulphide, almost insoluble in water; combines chemically with oils of turpentine and peppermint, forming non-luminous and comparatively non-poisonous liquids.

Uses.—As a nervine stimulant is given for nervous prostration, paralysis agitans, locomotor ataxy and impotence. It is useful in neuralgia—especially in aged persons, in leucocythæmia, and in some skin diseases. In psoriasis, chronic eczema, and lichen it acts somewhat like its chemical ally, arsenic.

Cases of tubercular meningitis, osteomalacia, diabetes and lymphadenoma have improved under its use.

There is no evidence that the central nervous system is ever in a condition of phosphorus starvation. The evidence that phosphorus retention is increased by giving organic and inorganically combined phosphorus is conflicting.—B.M.J. ii./10,1598.

N.B.—Phosphorus preparations should be recently made and kept from the light.

Elixir Phosphori.

Add Compound Tincture of Phosphorus 1, to Glycerin 4.

Dose.—15 to 60 minims (**1 to 4 Cc.**) in water. Contains $\frac{1}{50}$ grain in one drachm. A palatable well tolerated 'fluid' form of Phosphorus.

Oleum Phosphoratum (*Off.*).

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), on sugar or in perles.

Contains about 1% (by weight) of Phosphorus in prepared almond oil. (*Off.* now flavoured with Lemon Oil.)

Flavoring.—Emulsified and Glyl Rosæ added, taste is covered but more usually given in **Perles** or **Pills.**

Perles of Phosphorus. Contain $\frac{1}{100}$, $\frac{1}{65}$, and $\frac{1}{32}$ grain.

Phosphorated Cod Liver Oil Capsules. *Dose.*—1 to 4.

Prepared by diluting Phosphorated Oil, B.P. 1893, with Cod Liver Oil. Contain one-half drachm, each equivalent to $\frac{1}{100}$ grain phosphorus.

Rickets well treated by Phosphorated Cod Liver Oil.—E. Pritchard, B.M.J. ii./19,627.

Pilula Phosphori (*Martindale*).

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Phosphorus 1 and Oil of Theobroma *q.s.* to 100.

Heat the oil to 150° C. and sustain the heat for 5 minutes. Strain and weigh 99 into a wide-necked bottle with an india-rubber cork, and when cooled to 65° C. add the Phosphorus, cork and shake well till the fat begins to solidify. In rolling it into pills, divide into suitable lots, and beat each in a mortar to render it plastic before applying it to the machine, then work off quickly and cover with sandarach solution. The mass contains 1% of Phosphorus in perfect solution. A few drops of chloroform added during manipulation checks oxidation. When phosphorus is to be combined with other ingredients in a pill, the following is best used :—

Sevum Phosphoratum, 10%. (Martindale).

Phosphorus 1, Pure Carbon Bisulphide 5. Dissolve and add Prepared Mutton Suet 9. (**Sevum Præparatum***, is the purified internal fat of the sheep, M. pt. 45 to 50° C., prepared by melting and straining.—*Off.*).

Add a little of the suet at first, mix quickly, add the remainder, mix thoroughly and allow the bisulphide to evaporate. May be used to make the following pills. They are perfectly stable as there is no interaction or decomposition.—B.M.J. i./02,578 ; P.J. i./02,224.

Pilula Phosphori ($\frac{1}{50}$ grain) **cum Ferro** (3 grains).

Phosphorated Suet 10 grains, Reduced Iron 150 grains, Compound Tragacanth Powder 10 grains, Chloroform 15 minims. Mix, and add quickly, Mucilage of Acacia *q.s.*

Divide into 50 pills (or into 750 pills if the quantities be taken in grammes). Cover with Sandarach Solution. They are also made with **Nux Vomica** ($\frac{1}{3}$ grain).

Pilula Phosphori ($\frac{1}{50}$ grain) **cum Quinina** (1 grain).

Phosphorated Suet 10 grains, Quinine (base) 38 grains (=50 grains Sulphate), Chloroform 20 minims. Mix quickly, and add Compound Tragacanth Powder 10 grains. Mucilage of Acacia *q.s.*. Mix, and divide into 50 pills (or into 750 pills if the quantities be taken in grammes). These pills are also made with **Reduced Iron** 3 grains, and with **Reduced Iron** (3 grains) and **Strychnine** ($\frac{1}{40}$ grain).

P1 **Pilula Phosphori** ($\frac{1}{50}$ grain) **cum Strychnina** ($\frac{1}{40}$ grain). Prepare as Pilula Phosphori cum Quinina, with Strychnine $1\frac{1}{4}$ grains *vice* Quinine 37 grains. These are also made with **Reduced Iron** (3 grains).

Dose.—Any of the above pills are best taken directly after meals.

Tinctura Phosphori Composita. *Adopted by B.P.C. Dose.*— 3 to 12 drops on sugar.

Phosphorus 1, Chloroform 85. Warm gently in a stoppered bottle till dissolved, and add the solution to Absolute Alcohol to 500. Shake well and keep in the dark. Contains 1 in 500. Becomes acid on keeping.

Phosphorus Pentachloride. $PCl_5 = 208{\cdot}34$. ***Manufacture.***—Pass chlorine *q.s.* into a cooled solution of phosphorus 1 in carbon disulphide 4 until a portion removed no longer gives phosphorescent residue when evaporated on paper. Then remove the carbon disulphide by filtration with aid of reduced pressure, *e.g.* water pump. A yellowish white crystalline mass fuming in moist air, employed chemically in numerous reactions for example substitution of hydroxyl groups with chlorine.

***Sevum Benzoatum** is the same digested with 3% Benzoin 1 hour at 60° C.

Zinci Phosphidum, Zn_3P_2=258·19.

Dose.—$\frac{1}{20}$ to $\frac{1}{3}$ grain (**0·003 to 0·02 Gm.**) in **Pill.** Fr. Cx.—Max. single dose $\frac{1}{8}$ grain; Max. during 24 hours $\frac{1}{4}$ grain approx.

A grey crystalline powder. With acids yields phosphoretted hydrogen.

Phosphorus Determination in Vermin Killers.—Y.B.P. 1919, 124.

Acidum Hypophosphorosum, U.S. H_3PO_2=66·064.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**).

A colourless liquid, strength 30%.

On heating, water evaporates and the acid decomposes at 130° to 140° C., forming hydrogen phosphide, which ignites, and phosphorous acid. The latter decomposes at 160° to 170° C. into hydrogen phosphide and phosphoric acid finally the last portions of unoxidised phosphorus burn out at a higher temperature (U.S.).

Hypophosphites. There is no reliable evidence that they exert a physiological effect or influence any pathological process.—Jl. Am. Med. Assn., per P.J. i./16,247.

Acidum Hypophosphorosum Dilutum, U.S.

Average dose.—8 minims. 10% strength. Sp. Gr. 1·042 at 25° C.

Uses.—Its Salts are mostly employed. It may be added to Syrup of Ferrous Iodide to preserve same.

Method for the determination of a Hypophosphite.—P.J. i./12,12.

Ammonii Hypophosphis. $NH_4.H_2PO_2$=83·098.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**).

In white deliquescent tabular crystals, soluble 5 in 6 of water. Insoluble in alcohol. It has a nauseous saline taste. ***Incompatible*** like the Calcium Salt. Nervine tonic.

Calcii Hypophosphis.

$Ca(H_2PO_2)_2$=170·182.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White crystalline salt, with nauseous taste, soluble 1 in 7 of water. Prepared by heating phosphorus with milk of lime until phosphoretted hydrogen ceases to be given off, then filter and evaporate to crystallise or precipitate with alcohol.

Incompatible with oxidising agents, and with Potassium Iodide.

Uses.—Nervine tonic and aphrodisiac. Checks night sweats of phthisis, and is used in acne. In epilepsy has proved serviceable.

Mistura Calcii Hypophosphitis.

Calcium Hypophosphite 5 grains, Saccharated Lime Solution 1 drachm, Peppermint Water to 1 ounce.

Barii Hypophosphis.

$Ba(H_2PO_2)_2$=267·482.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

White crystalline salt soluble in water $3\frac{1}{2}$. Prepared in manner analogous to the above and its properties are similar.

Ferri Hypophosphis.

$Fe(H_2PO_2)_3$=251·008. *Syn.* Ferric Hypophosphite.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) in a pill.

In commerce is a whitish amorphous powder with a chalybeate taste slightly soluble in water, but more so in presence of Potassium Citrate.

Liquor Ferri Hypophosphitis Fortis, B.P.C.

Dose.—10 to 30 minims (0·6 to 2 Cc.).

Dilute 23 of Solution of Ammonia with equal volume of Distilled Water, gradually add Solution of Ferric Sulphate 14·2 previously diluted with an equal volume of water; wash the precipitate by decantation with Distilled Water until free from Sulphates, collect on calico, drain and transfer to a porcelain dish. Add Citric Acid 7·6 and Water 20, heat on a water-bath, with occasional stirring until clear, and then add Sodium Hypophosphite 9·6, and continue heating with stirring about one minute, or till a clear greenish solution results. Add Sodium Citrate 6·6, filter, and pass sufficient Chloroform Water (1 in 200) through the filter to make volume up to 100.—P.J. i./o7,102.

P1 **Pilula Ferri Hypophosphitis cum Strychnina.** Strychnine $\frac{1}{30}$ grain, Ferrous Hypophosphite 2 grains. To make one pill (or in grammes to make 15). *Dose.*—1 twice or thrice daily.

Magnesii Hypophosphis—$Mg(H_2PO_2)_2$, $6H_2O$ = 262·528.

Dose.—3 to 10 grains (0·2 to 0·6 Gm.). White crystalline salt soluble in water, about 1 in 4½.

Potassii Hypophosphis, KH_2PO_2=104·156.

Dose.—1 to 6 grains (0·06 to 0·4 Gm.).

A deliquescent granular white powder, having a nauseous, bitter taste. Soluble 1 in 1 of water. Incompatible as the Calcium Salt.

Flavoring.—Syl Aurantii Floris; Glyl Rosæ, Elixir Simplex.

Sodii Hypophosphis (*Off.*). NaH_2PO_2=88·056 (+H_2O,U.S.).

Dose.—3 to 10 grains (0·2 to 0·6 Gm.). Average U.S. 15 grains (1 Gm.).

A white granular deliquescent salt, with a bitter, nauseous taste. Soluble 1 in 0·63 of water.—P.J. i./o2,552; and freely soluble in alcohol. With an equal quantity of Sodium Nitrate is explosive. See also Calcium Salt.

Uses.—In phthisis, and as nutrient in wasting diseases generally.

Flavoring.—Syl Sassafras, Syl Lavandulæ, Syl Amygdalæ Amaræ; Syrupus Aromaticus.

Ⓟ**Syrupus Hypophosphitum Compositus,** U.S. VIII.

Average dose.—2 drachms (8 Cc.).

Ferric 2·25, and Manganese Hypophosphite 2·25, with Sodium Citrate 3·75 are first dissolved in Water 30, then Calcium 35, Potassium 17·5, and Sodium Hypophosphites 17·5 are dissolved in water 400, with Diluted Hypophosphorous Acid 5. Quinine (base) 1·1 and Strychnine (base) 0·115, with Hypophosphorus Acid 10 are then dissolved in water 30. Finally, Sugar 775 is dissolved in the mixed solutions and made up to 1,000 with water. Chloroform 1 in 500 added we find improves its keeping qualities. It contains approximately $\frac{1}{120}$ grain of Strychnine Hypophosphite in a drachm.

In phthisis and like cases, hypophosphites raise the nervous power and improve condition of the secretions. Given in sufficiently large doses for at least 6 months, good result.—Pr. Jan, '13,127.

Ⓟ**Tablets of Compound Hypophosphites** each weighing 2 and 4 grains and equivalent to ½ and 1 drachm of the above are prepared.

Ⓟ✱**Fellows' Compound Syrup of Hypophosphites** (T.M. 20267 and others) is stated to contain in 100 Gm., Potassium, Manganese and Calcium Hypophosphites each 1·2 Gm., Iron Hypophosphite 1·4 Gm., Quinine Hypophosphite 1·0 Gm., Strychnine Hypophosphite 0·02 Gm

Dose.—Medium Adult, 1 drachm, Children in proportion.
Ⓟ An American syrup sold as **Hematic Hypophosphites** is similar (contains strychnine hypophosphite ⅛ grain in 1 ounce.)

Great care must be taken to distinguish the above preparation which contains strychnine from the following, which contains none:—

Syrupus Hypophosphitum, U.S. has Hypophosphite of Calcium 45, of Potassium 15, of Sodium 15 with diluted Hypophosphorous Acid 2, Sugar 600, Glycerin 50, Water *q.s.* to 1,000. *Average dose.*—2 drachms.

Churchill's Syrup of Hypophosphites.—A proprietary article. Contains no strychnine, *c.f.* also Churchill's Inhalant.

Ⓟ**Pulvis Hypophosphitum Compositus.** *Dose.*—1 to 4 grains (0·06 to 0·25 Gm.).

Calcium Hypophosphite 37½, Sodium Hypophosphite 20, Manganese Hypophosphite 2½, Quinine Hypophosphite 1½, Strychnine Hydrochloride Trituration *q.v.* 1⅓, Iron Hypophosphite 2½, Milk Sugar to 100. Five grains = $\frac{1}{150}$ grain Strychnine Hydrochloride, approx. *i.e.* 1 drachm of the U.S. VIII. Syrup

Ⓟ**Glycerol Hypophosphitum, Glycerol of Hypophosphites.** *Dose.*—1 drachm (4 Cc.).

Dissolve Calcium Hypophosphite 160 grains, Manganese Hypophosphite 80 grains, Potassium Hypophosphite 160 grains, Quinine Hypophosphite 80 grains, Strychnine Hypophosphite 2½ grains in Distilled Water 3 ounces, and add Strong Solution of Ferric Hypophosphite (B.P.C.) 4 ounces, Hypophosphorus Acid 2 drachms, Glycerin to produce 20 ounces. Each drachm contains Strychnine Hypophosphite $\frac{1}{64}$ grain, and Quinine Hypophosphite ½ grain.—P.J. i./06,385.

Wheat-Phosphates, Saccharated the soluble part of bran—the organic phosphates and cerealin (ferment of bran) combined with milk sugar—are specially useful in weakly and rickety children, and where digestion is impaired, seem to aid the assimilation of food and even of such medicines as iron. *Dose.*—Half a teaspoonful (increased) 2 or 3 times a day, may be taken as sugar with food.

✱**Phytine.** (T.M. 267573). A vegetable preparation (calcium and magnesium phosphates with oxymethylene diphosphoric acid), containing about 22·8% organic phosphorus. A nervine tonic. Capsules 4 grains. Tablets 4 grains, Cachets 8 grains, and Phytin Liquid and Powder are supplied. *Dose.*—Equivalent of 2 capsules twice daily or increased. Children less.

Quinine Phytine has 57% of Quinine, is a yellowish powder *Dose.*—Similar to the preceding.

PHYSOSTIGMATIS SEMINA.

Calabar Bean (B.P. 1898). **U.S.** *Syn.* ORDEAL BEANS, from West Africa.

Dose, in powder.—1 to 4 grains. U.S. *average dose* 1½ grains.
History of introduction of the drug.—Gordon Sharp, P.J. i., 16,619.

The poisonous properties of the ripe seed of *Physostigma venenosum* (*Leguminosæ*) are chiefly due to Physostigmine, which is contained in the cotyledons only, the content being about 0·25%. In addition Eserdine (Bohringer) and Eseramine (M.pt. 245° C.) are said to be constituents.

Of Physostigmine (0·179% in the bean) two inter-convertible modifications were obtained.—Melting at 86 to 87 and 105106°, *i.e.*, it is dimorphous.

Other constituents are stated to be Physovenine $C_{14}H_{18}O_3N_2$ M.pt. 123° —a new alkaloid also powerful myotic, Trifolianol $C_{21}H_{34}O_2(O.H.)_{21}$ and

Calabarol $C_{23}H_{34}O_2(O.H.)_2$ M.pt. 245° also Stigmasterol $C_{30}H_{48}O$. and Sitosterol $C_{27}H_{46}O$.—J.C.S., 1911, 2148.—C.D. ii./11,790. J. i./13,363.

U.S. requires 0·15% Ether-soluble alkaloids.

Antidotes.—Emetics, Atropine or Belladonna, Chloral, Strychnine, Tannin Potassium Permanganate 10 grains in 1 pint of tepid water, by stomach tube, repeated in ½ hour. Stimulants freely.—Murrell.

Uses of Physostigma.—Preparations of Physostigma and solutions of its alkaloid Physostigmine ¼ to 1%, applied topically to the eye, contract the pupil, and are antagonistic to atropine.

As a myotic the solution acts in 5 to 15 minutes and the pupils remain contracted for 12 hours. It is employed to overcome the over dilatation caused by Atropine, Homatropine and Cocaine.—G. Sharp, P.J. i./16,619.

Traumatic tetanus has been well treated with extract ⅛ grain every hour, then ½ grain every 2 hours; or give Physostigmine hypodermically, and increasing every hour, so as to paralyse little short of arresting the breathing. For chorea also it is given in smaller doses. In paralysis it arrests muscular wasting and improves muscular power. In hemiplegia or paraplegia, give doses of $\frac{1}{30}$ to $\frac{1}{10}$ grain of extract frequently.—R.

Ⓟ**Extractum Physostigmatis** (B.P. 1898).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

An alcoholic extract containing three-fourths of its weight of milk sugar. Yield about 2 to 5%.

Alkaloidal content varies very considerably. U.S. IX. (in powder form) standardises to contain 1·7 to 2·3% physostigma alkaloids.

Modification of process suggested.—Am. Jl. Ph. Nov. 1911. 524.

Ⓟ**Tinctura Physostigmatis** B.P.C.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**)

Calabar Bean, in No. 40 powder, 1, Alcohol 90% *q.s.* to 5. (U.S. IX. has 1 in 10 of Alcohol 94·9% vol. and standardises to 0·015% alkaloids.)

It is antagonistic to strychnine, but is *not* to be depended on as a remedy for poisoning by nux vomica or strychnine.

$\boxed{\text{P1}}$**Physostigmina.** *Syn.* Eserine.

$C_{15}H_{21}N_3O_2=275{\cdot}273$.

Dose.—$\frac{1}{100}$ to $\frac{1}{50}$ grain (**0·0006 to 0·0013 Gm.**).

In colourless crystals, slightly soluble in water, freely in ether, soluble 1 in 180 of vaseline. Solution in castor oil, ½ to 1% (by weight), keeps well for ophthalmic use.

Ⓟ**Unguentum Physostigminæ, R.O.H.**

Physostigmine 0·25, Soft Paraffin 100; heat to dissolve.

$\boxed{\text{P1}}$**Physostigminæ Salicylas,** U.S., P. Austr., Fr. Cx., P.G.V.

$C_{15}H_{21}N_3O_2.C_6H_4.(OH)\ COOH = 413{\cdot}356$.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

In needle-shaped or columnar crystals. Soluble 1 in 140 of cold water; much used as a myotic in solution. Not so liable to turn pink as that of the sulphate. In glaucoma suited for prolonged use.

Ⓟ**Tablets, Hypodermic** $\frac{1}{500}$ grain.

To open the bowels in acute abdominal conditions $\frac{1}{100}$ grain hypodermically until 6 doses have been given (four hourly). This dose is safe—higher dose may act too severely and necessitate bismuth and opium to check the resulting diarrhœa. If no action give a turpentine enema the following day. The muscular coat of the intestine is directly stimulated by Eserine.

🄿1**Physostigminæ Sulphas.** **P.G.**
$(C_{15}H_{21}N_3O_2)_2\ H_2SO_4 = 648{\cdot}622$.
Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**). (*Off.* $\frac{1}{64}$ to $\frac{1}{32}$ grain).

In yellowish granular crystals, deliquescent and soluble about 4 in 1 of water. Solution becomes pink, but does not lose much in efficacy.

In doses of $\frac{1}{100}$ grain (**0·0006 Gm.**) of value in tympanites as occurring in typhoid fever.

Ⓟ**Guttæ Physostigminæ** R.O.H. 0·062, 0·125, 0·25, 0·5 or 1%. **St. Th. H.** 0·5, or 1%. St. M.'s H. 0·5%.

🄿1**Guttæ Physostigminæ cum Cocaina, R.O.H.**
Physostigmine Sulphate 0·25, and Cocaine Hydrochloride 1, Water to 100. 🄿1St. M.'s H. 0·25 and 1·25 respectively in 100.

Ⓟ**Guttæ Physostigminæ et Quininæ.** Liverp'l Eye and Ear Inf.
Physostigmine Sulphate 1 grain, Quinine Sulphate (Bisulphate) 4 grains, Distilled Water 1 ounce.—B.M.J. i.'04,452.

Ⓟ**Injectio Physostigminæ Sulphatis Hypodermica.** 1%. *Dose.*— 1 to 4 minims (**0·06 to 0·24 Cc.**).

Ⓟ**Lamellæ Physostigminæ (Sulphatis).** (*Off.*). R.O.H.
Each contains $\frac{1}{1000}$ grain (**0·000065 Gm.**); also prepared containing $\frac{1}{250}$ grain and $\frac{1}{500}$ grain respectively, for ophthalmic use. Also 🄿1$\frac{1}{1000}$ grain, combined with Cocaine $\frac{1}{200}$ grain.

Ⓟ'**Sterules**' of Physostigmine Sulphate Solution 4 grains to the ounce are prepared, also Ⓟ'**Sterules**' of Physostigmine Sulphate, 1 grain with Cocaine Hydrochloride 4 grains to the ounce.

Ⓟ **Unguentum Hydrargyri Oxidi Flavi Cum Physostigmina.**
Physostigmine 0·25, Soft Paraffin or Lanoline (anhydrous) 100; heat till dissolved, and add, when cold, Yellow Mercuric Oxide 1.

For corneal ulcers in scrofula, solution of 2 grains to an ounce may be dropped into the eye; also in mydriasis and glaucoma.

Ⓟ**Tablets of Eserine with Truneček's Serum** (*q.v.*).
No. I. contain 0·00025 Gm. Eserine in each, with the salts of 50 Cc. of Truneček's Serum.
No. II. contain in addition to the constituents of No. I. atropine 0·00005 Gm. each, for use in the severest forms of intestinal inaction and in obese diabetic patients. Both forms of Tablets weigh 8 grains (0·5 Gm.) each.
Eserine is given in this way, with or without atropine, for diabetes, on the supposition that the disease is due to arteriosclerosis of the pancreas.
Maximum dose of either—6 tablets per diem.

PILULÆ.

A pill mass should disintegrate readily in water or physiological acid at blood heat. This is effected by a careful choice of excipient combined with adequate manipulation.

For pills intended to be varnished, use equal parts of powdered gum acacia and tragacanth with syrup *q.s.* Glycerin as an excipient, if used at all, is best mixed with alcohol. It is unsuited for hygroscopic drugs, such as soft extracts, squills, aloes, &c. For these mucilage of acacia or syrup is preferred, and tragacanth in moderation is very useful as a 'hardener.' For insoluble metallic salts, glycerin of tragacanth (*q.v.*) may be employed, adding, if necessary, a small quantity of powdered acacia or althæa to give firmness.

For **Aloes** Pills Compound Decoction of Aloes is sometimes used.

For **Camphor** a little Tragacanth or Soap and Castor Oil; if with Quinine, Tragacanth and Glucose Syrup, *q.s.*

Unguentum Kaolini (*q.v.*) works satisfactorily for oxidising agents such as **potassium permanganate.** For **Oils**, soap is best used.

In the official Pill masses **Syrup of Glucose** is employed; this is prepared by heating Glucose 1, with Syrup 2, *v. also* **Glucantha.**

Codeine and other Pills given in diabetes should not be massed with Syrup of Glucose.

As a means of rendering pills tasteless, silvering or gilding is giving place to covering them with solution of sandarach, gelatin, or pearl-coating them with French chalk and gum, or sugar-coating them.

Varnishing Pills.—The late W. Martindale suggested the use of a sandarach solution—1 part sandarach* in 1 part of absolute alcohol (= Pill Varnish). The pills should be free from powder, as every imperfection will show through the transparent coating Having placed them in a covered pot, a few drops of the sandarach solution are added and diffused equally by a few circular movements of the pot. They are then poured out on a plate and detached from each other. Shortly afterwards they are moved carefully with a pointed glass rod dipped in alcohol. In about 30—60 minutes they will be dry.

In **Coating** Pills with **Gelatin** they should be free from powder, and not too dry. A solution is prepared by dissolving 1 part of gelatin in 4 parts of water, straining whilst hot through fine muslin, allowing to cool and re-heating to get rid of air bubbles. The pills are stuck on the points of fine needles and dipped into the solution, kept hot by a water bath; as they are taken out, each needle is slowly revolved to make the coating even on the pill, the reverse end of the needle is then stuck into a sheet of cork or pincushion, and the needles are left in this upright position till the pills are dry—in about ½ hour. On a large scale they are held in a frame by suction, and dipped half at a time.

In **Pearl-Coating** the Pills are first evenly covered with a mucilage of tragacanth 4 grains to 1 ounce with half a drachm of syrup added; they are then thrown into a covered pot having a concave bottom and containing some finely powdered French chalk; after gently rotating them in this for a few seconds they are turned into a third similar pot and rotated slowly; the excess of powder is then blown off, and they are finished by shaking round until polished.

The **sugar-coating** of Pills can only be done successfully in large quantities, and the pills must be hard and dry; they are placed in a hemispherical metallic pan kept warm, while making eccentric revolutions, and are alternately moistened with syrup, and dusted with finely-powdered sugar, till dry and uniformly covered.

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* Resin from *Callitris quadrivalvis* (*Coniferæ*). *Alcohol Sandarachi*, R.D.H. For dental use. Sandarach 2, Alcohol (90%) 1. Sandarach—chemistry of. Various acids—Sandaracorosene and volatile oil found by Tschirch.—P.J /07,202)

Methods of Coating Tablets, Pills, Capsules, &c., to render them insoluble in the Gastric Juice but soluble in the Intestines.

Various substances have from time to time been suggested for coating pills, tablets and capsules so as to render them insoluble in the stomach but soluble in the intestines, *i.e.*, on reaching the duodenum. Drugs, for example, which irritate the mucuos membrane and the administration of which is liable to induce vomiting, and substances intended to act solely on the intestines and the anthelmintic drugs have been so given.

We have conducted a large amount of experimental work on this subject and we are convinced that *Keratin*, as usually employed, seldom brings about the desired effect.

Keratin* is an ammoniacal solution of horn shavings. The commercial solution must be concentrated for use. In using Keratin the pills must not contain moisture or vegetable powders. As a pill basis employ Kaolin with Suet, coat 3 to 5 times with the Solution and finally roll in non-absorbent powder. A coating of wax prior to the Keratin coating is sometimes employed.

Benzonaphthol Varnish.—Benzonaphthol 6, Tannigen 10, Salol 20, Alcohol 90% 30, Ether 100, has also been recommended, but we obtained no better result with it.

Salol applied *melted* is more efficacious. No gum or varnish method with powdered Salol is of any avail at all. 1½ to 3 grains of Salol applied in this way is suitable for a 3 to 5 grain pill. *c.f.*, Bismuth Compound Pills, p. 234.

The outcome of our work is a coating containing **Stearic Acid** *inter alia*. Stearic Acid alone is useless,—it cracks on drying. For details of experimentation with this and other coatings *vide* Edn. XV., p. 612 and 613.

***Stearettes** (T.M. 322854) (Martindale) as tablets so coated are designated, are prepared of the following :—

Aceto-Salicylic Acid 2 to 5 grains.
Aloes 2 to 4 grains.
Antipyrin 1 to 5 grains.
Areca 2 to 5 grains.
Calcium Sulphide ½ and 1 grain.
Carbolic Acid ½ to 1 grain.
Ipecacuanha ¼ to 2 grains.
Magnesium Peroxide 3 grains.
Menthol ½ to 1 grain.
Methylene Blue ½ to 1 grain.
Naphthol Bismuth 2 to 5 grains.
Pancreatin 1 to 2 grains.
Phenol Bismuth 2 to 5 grains.
Potassium Iodide 5 grains.
Quinine Aceto-Salicylate ½ to 2 grains.
Quinine Salicylate ½ to 2 grains.
Quinine Sulphate ½ to 3 grains.
Reduced Iron 1 to 3 grains.
Sodium Salicylate 2 to 5 grains.
Thymol ½ to 1 grain.
Trilactine.

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* **Keratinum.**—*Dose.*—8 grains (**0·5 Gm.**). It was found that Keratin, in combining with the gelatinous constituent 'glutine' of connective tissue forms in the body a nutritive substance. Administered for syphilitic chronic myelitis and for tabes dorsalis, and has, perhaps, the power of checking the proliferation of connective tissue, and thus to be capable of combating locomotor ataxy.—F.N., 1908,149.

Stearettes should as far as possible be given immediately after a meal—*i.e.*, when the stomach is *acid.*

Pills.—The 'Stearette' coating is also applicable to pills but with greater difficulty. Tablets are easier to operate upon.

Formagules (Formalised Gelatin Capsules).

In carrying out experimental work for our XIVth edition we endeavoured to determine the length of time necessary to treat gelatin with formalin to make an '**Intestinal**' **Capsule.**

Ordinary freshly made gelatin Capsules (whether hand or machine made) immersed in Commercial formalin for 10 *to* 15 *minutes*; *then removed and rinsed free of excess of formalin with a little water and finally dried in blotting paper will probably pass intact through the stomach and be digested in the intestines.*

But it should be noted that where the digestive functions are abnormal this length of time of formalising may be too long—in such 5 minutes according to recent trials may suffice.

Capsules which have been allowed to dry somewhat may require less time in the formalin bath—note also that the formula of the 'Capsule Mass,' the thickness of the coating, and other points must be taken into consideration.

The following **Formagules** are suggested :—

Aloes 2 to 4 grains.
Asafœtida 5 grains.
Copaiba 5 to 10 minims.
Creosote $\frac{1}{2}$ to 2 minims.
Eucalyptol $\frac{1}{2}$ to 1 minim.
Guaiacol Carbonate 1 to 4 grains.
Ichthylol 1 to 5 grains.
Iodipin 10 minims.
Iodoform 1 and 3 grains (as test). —See p. 492
Male Fern Extract 10 minims.
Methyl Salicylate $\frac{1}{2}$ to 1 minim.
Ox Gall 5 to 10 minims.
Quassia Extract 2 grains.
Salol 2 to 10 grains.
Santal Oil 5 to 10 minims and Compounds.
Santalol 5 minims.

Formagules should be employed for substances which irritate gastric mucous membrane, neutralise acidity of stomach, or are to act on intestinal membrane but not in the stomach, *e.g.*, to destroy worms.

Sahli's Glutoid Capsules are made on these lines. *Vide* also **Membroids.**

A revised list of pills in general request is contained in the Index.

✱**Pulverette** (T.M. 293309) **Powder Pills (Patent)** are of special manufacture. These have a thin coating easily crushed.

Cachets of wafer paper are useful for enclosing nauseous medicines and drugs that do not yield all their activity to any solvent, and those whose suspension in fluids is difficult or inaccurate owing to non-diffusibility or decomposition.

Gelatin (Hard) Capsules are short tubes closed at one end, telescoping into one another, used for a similar purpose. **Soft Gelatin Capsules** are useful for dispensing nauseating drugs, particularly oils, *vide* Index.

A pill, cachet, or, in fact, any medicine, should always be followed by a draught of water, to carry it quickly through the œsophagus.

Deliquescent Drugs in Capsules. Beeswax 1, Castor Oil 3, melted together. About 1½ grains of this is sufficient to mass a dose of 10 or 12 grains of Potassium or Sodium Iodide. Also suitable for guaiacol and sandal wood oil. 1 or 2 grains of iodine require 5 grains of the mass.—P.J. ii./16,487.

Collapsible tubes of medicines for internal use in a semi-solid basis suggested as preferable to tablets, etc., for use in the trenches, the dose to be arranged in a given length of jet, *e.g.*, 1 inch.—F. W. Tunnicliffe, L. i./15,274.

PINUS.

Pinus Sylvestris. *Syn.* SCOTCH FIR OR PINE.

From the wood of this tree (principally in America, France and Russia) much of the oleo-resin, common turpentine, oil of turpentine, Gum Thus or American frankinsence, resin or colophony and tar (*vide* Pix Liquida) are produced. From its leaves also are prepared an extract, volatile oil and wool.

Oleum Terebinthinæ (Rectificatum). *Off.* (*Syn* CAMPHINE), is distilled from the Oleo-Resin Turpentine obtained from *Pinus Sylvestris* and other species of *Pinus*. Sp. Gr. 0·860 to 0·870. Almost entirely distils between 156° and 180° C. without appreciable residue. O.R. varies from different countries.

See Vol. II. for further data.

Oleum Terebinthinæ Æthereum, FR. CX., is distilled from *P Pinaster* in France. Sp. Gr 0·864 at 15° C.

Capsules of Oil of Turpentine, 5 and 10 minims each. *Dose.*—1 or more.

Uses.—In internal hæmorrhage 10 minim doses often successful. In enteric has been given as capsule or emulsion with Spirit of Chloroform—10 minims every two or three hours. Anthelmintic (3 to 4 drachms or more) generally given with Castor Oil. Also given to remove fæcal masses (with Castor Oil) and to remove bile concretions.

Large dose, 2 drachms to ½ ounce and more said to be non-irritant, as also 5 to 10 minim doses, but moderate doses 30 to 60 minims to be used with caution. Large doses act on bowel only, and are little absorbed into the circulation. Hæmostatic in hæmorrhagia purpura. For children of 10 to 12 as much as ½ ounce given with equal quantity of Castor Oil.—B.M.J. i./09,1218.

Loss of sight in a child of ten after measles treated by (*inter alia*) 2 drachm doses of Turpentine Oil with an equal quantity of Castor Oil every night at bed-time. Great benefit to sight and general health in a month. The turpentine must be in sufficiently large dose to have aperient action, as the smaller doses act on the kidneys. Should the desired aperient effect not be obtained with this dose, it may be increased as far as half-an-ounce of each oil. This treatment is of good service in obstinate inflammatory or semi-inflammatory conditions of the eye.—B.M.J. i./11,82; P.J. i./11,96.

In cases of urethritis of a chronic kind, urethral chancroid and specific urethritis, local applications of Turpentine to the urethra by means of a catheter have given very satisfactory results.—L. i./11,982.

In enteric fever a preliminary thorough cleansing of the bowel by small divided doses of Calomel followed by Castor Oil prepares the ground for an enema of 1 ounce with Olive Oil 1 pint given slowly. Next day or day after repeated. In most instances the amount of Turpentine may then be reduced to ½ ounce in Olive Oil 15 ounces, this is administered on alternate days throughout the whole course of the disease and continued until convalescence is established.—B.M.J. i./10,195.

Acute nephritis due to Turpentine absorbed by rubbing a liniment containing Turpentine, Ammonia and Camphorated Oil into a child's back and skin. Recovery under milk diet and free opening of the bowels.—B.M.J. ii./12,881.

Hæmostatic action of Turpentine when brought into immediate contact with the surface. Arrested hæmorrhage in a "bleeder" under operation. Use as a compress by soaking lint in it and squeezing nearly dry. Support by a pad of wood wool and fix with a firm bandage. Also successful in secondary hæmorrhage in war wounds. Value when taken by the mouth doubtful.—G. G. Turner, L. ii./15,226. See also *ibid.*, p. 416. Gauze lightly wrung out in it used to pack sloughing wounds, the change is remarkable. Avoid excess and none of the oil should lie outside the wound or the skin will blister.—C. A. Moore, B.M.J. ii./16,744.

For tape worm 1 ounce doses with castor oil. No injurious effect on the kidneys. Oakum soaked in it was used in the Peninsula War.—C. Foy, B.M.J. i./15,580.

Emulsum Olei Terebinthinæ, U.S.

Average dose.—1 drachm (4 Cc.).

Emulsify Turpentine Oil 15, Almond Oil 5, Acacia 15, with water 30, add Syrup 25 in portions, and finally water to 100.

Another form:—Turpentine Oil and Quillaia Tincture, of each 20 minims, water to 1 ounce.—B.M.J. i./06,318,480.

Enema Olei Terebinthinæ, St. M.'s H.

Turpentine Oil ½ ounce, Starch Mucilage to 10 ounces. L.H. has Turpentine ½ to 4 drachms, Soft Soap 1 ounce, Warm Water to 1 pint. The Oil is mixed with ½ of the Simple Enema. This is given and followed by the other half of Simple Enema.

For flatulent distension of the colon of great value. On diagnosis of appendicitis if considerable flatus, an enema of Turpentine Oil is of value. Some give a dose of Calomel, but the active peristalsis so set up may be harmful.

Stokes' Liniment, N.F. *Syn.* LINIMENTUM ALBUM.

Mix one entire egg with Rose Water 85 Cc. Strain and add Turpentine Oil 100 Cc., then Acetic Acid 20 Cc. Shake thoroughly to emulsify and finally add Lemon Oil 4 Cc.

Linimentum Terebinthinæ (*Off.*, and B.P. 1898).

Contains Turpentine Oil 65%. U.S. has Resin Cerate, melted on water bath, 65, Oil of Turpentine 35.

Knight's method is satisfactory.—Mix Solution of Potash (B.P. '98) 3 ounces, with water 3 ounces in a bottle, add Oleic Acid 7 drachms previously mixed with Oil of Turpentine 3 ounces, and mix gently. To this emulsion add Turpentine 10 ounces with Camphor 1 ounce dissolved in it, in portions of 1 ounce or more at a time.

Spiritus 'Antiparalyticus.'—Turpentine Oil 4, Oil of Amber 4, Camphorated Spirit 64, Solution of Ammonia 28. Used as a liniment.

Sapo Olei Terebinthinæ.

Turpentine 1, Soft Soap 2, Glycerin 1. As a vermicide—also a stimulant local application.

✱ **"Sanitas" Fluid,** (T.M. 64575), the solution resulting from the action of water upon air-oxidised turpentine, containing as its active principles hydrogen peroxide, thymol, a soluble camphor, and some camphoric acid. A household disinfectant and oxidiser. Non-poisonous, does not stain linen. Is used in midwifery. **"Sanitas" Oil** has Sp. Gr. 0·95. A strong oxidising agent. For inhalation in phthisis. Diluted with spirit used as spray in a room, or 1 in 8 to 20 of olive oil for skin affections.

✱ **"Sanitas Bactox"** (T.M. 279528). A disinfectant of the coal tar order for medical use having a Carbolic Acid co-efficiency upwards of 20 (*B, typhosus* test).

✱ **"Sanitas-Okol"** (T.M. 194594, Class 2) disinfectant. When diluted is non-poisonous. Does not contain Carbolic Acid. Stated to have a coefficient of 20 against the *B. typhosus* as compared with Phenol in absence of organic matter and 17·7 in presence of organic matter.—Klein. 18·6 in the case of *B. Coli*.

Shake thoroughly before use. For general use dilute 1 to 500 or 1,000. For cuts and wounds 1 in 300, skin affections 1 in 150.

✱ **"Sanitas-Sypol"** is described as a British make of the preparation which was commonly known as Lysol. A disinfectant forming a clear solution when mixed with water, non-caustic and without corrosive action on hands or instruments. For ordinary use ½% admixture with water. See also reference—Kingzett and Woodcock. Standardisation of Disinfectants *Vol. II.*

Extractum Pini Sylvestris. **Fir-Wool Extract.**
A thick brown liquid, readily soluble in water and having a faint pine odour; 2 to 4 ounces are added to a 30-gallon warm bath for rheumatism.

Oleum Pini, **Oil of Pine.** *Dose.*—½ to 3 minims (**0·03 to 2 Cc.**).
The oil of the leaf of *Pinus Pumilio* (*Coniferæ*) was official in the B.P. 1898. It is sold under the fancy names of *Pinol (T.M. 88383) and *Pumiline (T.M. 88468), and is used for inhalations. Jujubes, pastilles, and soaps are also medicated with it. About ⅘ of Pine Oil is soluble 1 in 5 of Alcohol 90%.

The oil distilled from the fresh leaves of *Pinus siberica* is now *Off.* as **Oleum Abietis.** Sp. Gr. 0·900 to 0·920. It should contain 30 to 40% of esters (calculated as bornyl acetate, $C_{10}H_{17}.C_2H_3O_2$), as determined by saponification with alcoholic potash. N.B.—the aroma of this oil is entirely distinct from that of *P. pumilio* and and *P. Sylvestris.*

Syrupus Pini Pumilionis—*Martindale.*
Dose.—1 drachm (**4 Cc.**).
Contains Pine Oil 1 in 60 in a dilute Glycerin and Syrup Solution.

Ⓟ**Linctus Pini, Terpin et Heroin.**—*Syn.* Elixir or Syrup of Pine, Terpine and Heroin.—*Martindale.*
Dose.—1 drachm (**4 Cc.**). Resembles the foregoing with addition of $\frac{1}{48}$ grain Heroin Hydrochloride and ¼ grain of Terpine Hydrate per drachm. Both are useful soothing antispasmodic preparations.

Elixir Pini et Terpin Hydratis (Simplex).
Dose.—1 drachm (**4 Cc.**) diluted.
Similar to the last mentioned, but without Heroin and containing a minimum of Alcohol, for children's use.

Ⓟ **Pinheroin.**
Dose.—1 drachm every 2 or 3 hours, if necessary.
Contains Heroin Hydrochloride $\frac{1}{40}$ grain, Terpine Hydrate 1 grain with Essence of Canadian Pine. A special preparation as a respiratory stimulant.
Ⓟ**Glycogelatin Pastils** (*q.v.*) are prepared containing each ½ minim of Pumilio Pine Oil with ⅛ Terpene Hydrate, and $\frac{1}{48}$ grain Heroin Hydrochloride.

Artificial Venice Turpentine.—Mix Resin 17, Linseed Oil (boiled) 12, Oil of Turpentine 8, or dissolve Resin in Oil of Turpentine; is mostly employed in the Arts. The true article exudes from the branches of the larch, *Larix Europœa* (*Coniferæ*). Common turpentine and artificial products consisting of colophony, resin oil and oil of turpentine, are often employed.—Allen, Vol. IV., 4th Edn., 1911,77.
Larch bark is an astringent (owing to Tannin content) and diuretic.

Alcoolat de Fioraventi. *Syn.* Balsamum Fioraventi, Fr. Cx.
Venice Turpentine (Térébenthine de Mélèze) 10, Elemi 2, Storax 2, Galbanum 2, Myrrh 2, Laurel Berries (Baies de Laurier) 2, Aloes 1, Galangal 1, Ginger 1, Zedoary 1, Ceylon Cinnamon (Canelle de Ceylan) 1, Cloves (Girofles) 1, Raisins (Muscades) 1, Origanum Dictamnus flowers (Dictame de Crète) 1, Alcohol (80%) 60. Macerate 2 days *s.a.* and distil to obtain 50. It is used as an embrocation in rheumatism.
For alopecia, Liquor Ammoniæ 1, Baume Fioraventi 15, Spirit of Camphor 15. Apply with friction after washing with black soap.—B.M.J.E. ii./09,24.

Balsamum Locatelli.—Venice Turpentine 18, Yellow Wax 12, Olive Oil 18, Balsam Peru 2, Dragon's Blood 1. For chilblains (even if broken).—Ph. Notes.

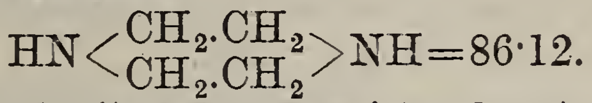
Dutch Drops, Haarlem Drops.—For lumbago and rheumatism.
Ph. Form. says:—Form now generally adopted in Denmark and Holland is —Heat to 165° C. in an iron vessel, large enough to allow some frothing

Linseed Oil 4 and Sulphur 1, with stirring, until mixture drops off the stirrer with a glassy appearance. Remove from the fire and add 15 parts (by weight) of Oil of Turpentine, and agitate until solution is complete or nearly so, then filter. The liquid should be limpid and of a brownish-red colour.

Analysis of a sample evidently the "Original" made by boiling sulphur with Linseed Oil or Turpentine or both.—L. i./12,444.

PIPERAZIN. Fr. Cx.

DIETHYLENE-DIAMINE.



$HN<\begin{matrix}CH_2.CH_2\\CH_2.CH_2\end{matrix}>NH=86{\cdot}12.$

T.M.: The word Piperazine by itself is not registered. A firm registered 166600/1892, a device embodying the word but disclaiming exclusive use of the word.

PATENTS: All expired.

Dose.—4 to 10 grains (**0·25 to 0·6 Gm.**), or 15 grains daily.

Manufactured by the action of sodium glycol on ethylene-diamine hydrochloride; colourless alkaline deliquescent crystals of saline taste, soluble about 4 in 7 of water. Melts at 104° to 107° C., B. pt. 145° C.

The following process has been given, but we have not tried it practically:—

A mixture of Ethylene Bromide, Aniline and Anhydrous Sodium Carbonate is heated to gentle boiling for 5 to 6 hours, the warm fused mass extracted with hot water and the crude Diphenyl Piperazine transformed into the Nitroso-derivative by suspending it in cold strong Hydrochloric Acid and gradually adding saturated solution of Sodium Nitrite through a tube reaching to the bottom of the acid. Add the precipitate to a 40% solution of Sodium Acid Sulphite and warm to about 80° C. Make strongly alkaline with Caustic Soda and concentrate by distillation. Distil the residue with superheated steam and collect in Hydrochloric Acid.—Pratt & Young, Jl. Am. Chem. Soc., 1918, 40, 1428, Y.B.P. 1919, 152.

Flavoring.—Glyl Sassafras, Glyl Caryophylli; Syrupus Aurantii.

Uses.—Given internally for the uric acid diathesis, in gout and rheumatism, and urinary calculi. Said to prevent change from glycogen into sugar in diabetes.

It used to be taught that owing to impaired power of excreting Uric Acid by the kidneys, the observed accummulation occurs in the blood and that in consequence Sodium Biurate was deposited in tissues, *e.g.*, cartilages giving the exciting cause of a paroxysm of gout. Of recent years the opinion has steadily tended back to closely resemble the original,—one cannot escape from the conclusion that Uric Acid is present in excess in the blood in gout because it is imperfectly excreted,—in no other way can the fact be explained that the excess in the blood is not accompanied by any excess in the urine, and often by some diminution of the output. The erroneous belief that urine in gout is loaded with uric acid had its origin in the frequency of uratic deposits or presence of Uric Acid Crystals in excess, but these have no necessary connection with excessive daily output,—they may be due to concentration and other conditions.

It is useless to administer a base and expect it to reach any spot in the body in sufficient quantity to have a chance against the Sodium which is so abundant in the blood and tissues. Uric Acid will show no preference for the base with which it forms a more soluble compound. There is hence no ground for the use of substances which form specially soluble urates. Uric Acid is a product of break-down of nucleo-proteins. In treatment avoid adding to excess of Uric Acid in the blood by limiting the parent substances, purin bodies and nucleo-proteins. Avoid meat extractives, sweetbreads, kidneys and varieties of fibrous meat. The thymus gland or throat gland is the richest food in purins. Eggs, milk and cheese are protein foods almost entirely purin free.—Sir A. E. Garrod. B.M.J. i./11,1413.

Though in theory such substances are inefficient, in practice Piperazin and its allies do afford relief.

Incompatible with alkaloidal salts, iron salts, quinine, sodium salicylate, spirit of nitrous ether.

Effervescent Piperazin contains 5 grains in a drachm. *Dose.*—1 drachm (**4 Gm.**). Also made with **Phenocoll.** 5 grains per drachm.

Tablets and 'Vescettes' of Piperazin, 5 grains (**0·3 Gm.**) to be crushed and taken in a draught of warm water.

Glycero-Piperaz.—*Syn.* PIPERAZIN GLYCEROPHOSPHATE, BASIC. $(C_4H_{10}N_2)_2C_3H_5(OH)_2PO_4H_2 = 344{\cdot}367$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

A granular white salt very soluble in water, neutral to Litmus and containing 50% Piperazin. Our work has shown that this salt is the most easy of the kind to prepare and the most stable. It does not deliquesce as do the neutral and acid salts.

Benzo-Piperaz. PIPERAZIN BENZOATE—$C_4H_{10}N_2(C_7H_6O_2)_2 = 330{\cdot}286$ and **Salicyl-Piperaz.** PIPERAZIN SALICYLATE—*Dose* 2 to 5 grains —$C_4H_{10}N_2(C_7H_6O_3)_2 = 362{\cdot}286$ are crystalline salts also suggested for therapeutic use.

Sidonal, New. *Dose.*—30 grains (**2·0 Gm.**).

TRADE MARK 229305 1900 removed from the Register 1914.

Said to be the anhydride of Quinic Acid (according to Zernick, Apoth. Zeitung 1906,463, approximately 75% Quinic Anhydride and 25% Quinic Acid). White crystalline powder, soluble about 1 in 2 of water, and about 1 in 11 of alcohol 90%. For gout. **Tablets** contain 7½ grains.

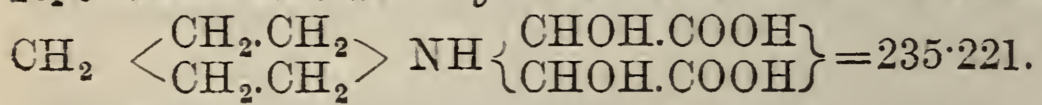
The original Sidonal was Piperazin Quinate. According to the Patent (No. 11420/1899, which became void), to make this, equivalent quantities of Piperazin and Quinic Acid are dissolved in the smallest quantity of water and evaporated as far as possible on the water bath. The remainder of the water is removed by repeated evaporation with a small quantity of Alcohol, the residual salt being dried in vacuo.

✱**Acitrin** (T.M. 252,63 and 322515).—Ethyl Ester of Phenyl-Cinchoninic Acid.

Dose.—8 grains (**0·5 Gm.**) 4 times a day.

Causes increased elimination of Uric Acid.—L. i./14,41.

Piperidinæ Tartras. *Syn.* PIPERIDINE ACID TARTRATE.



$$CH_2 \left\langle \begin{matrix} CH_2.CH_2 \\ CH_2.CH_2 \end{matrix} \right\rangle NH \left\{ \begin{matrix} CHOH.COOH \\ CHOH.COOH \end{matrix} \right\} = 235{\cdot}221.$$

The tartrate of the base piperidine made by reducing pyridine in alcoholic solution, with sodium amalgam or from Piperine by distillation with Soda Lime or by boiling with Alcoholic Potash.

Dose.—15 grains (**1 Gm.**) three times a day. Colourless pleasant-tasting crystals, readily soluble in water. Uric acid solvent.

Effervescent Piperidine Tartrate.

Dose.—1 drachm or more; 5 grains in 1 drachm.

Piperidine-para Sulphamine Benzoate.
$SO_2NH_2C_6H_4COOH.C_5H_{11}N=286·284$.

Under the name of ✱CALCUSOL (T.M. 246900) a combination of this salt with potassium bicarbonate is supplied in effervescent form, 5 grains in 60 grains, for the uric acid diathesis and renal calculus. **Tablets** of this combined salt and potassium bicarbonate are to be taken after or during meals in ½ tumbler of water.

PIX LIQUIDA.

Tar (*Off.*, and B.P. 1898). Known in commerce as Stockholm Tar, obtained by the distillation of the wood of various species of *Pinus* (*Coniferæ*). *Further details in Vol. II.*

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) in a pill with lycopodium, or in perles (2½ grains each).

As a diuretic and in bronchial catarrh and winter cough, it is very useful, and has been given for gastro-intestinal catarrh. ***Soluble*** about 1 in 1 of alcohol 90%. On account of their antiseptic properties both Wood and Coal Tar and preparations of them have been used for surgical dressings. The former yields Creosote, *q.v.* **Tenax** a refined variety of oakum is prepared for use as a surgical dressing.

Aqua Picis. **Tar Water.**—*Syn.* AQUA PICEA, EAU DE GOUDRON.

Tar 1, Sand 3. Mix and add distilled Water 200. Macerate with shaking for 24 hours, filter. *Dose.*—5 to 10 ounces (**150 to 300 Cc.**).

Pix Burgundica. *Burgundy Pitch*, the resinous exudation from *Picea excelsa* (*Coniferæ*), melted and strained was employed in making **Emplastrum Picis** (B.P. 1898).

D. Hanbury (P.J. 1850, 9, 400 and 1867, 27, 162) showed that the name 'Burgundy' Pitch is incorrect as it comes from Norway and is not made in France. *c.f.*, Power C.D. ii./13,515.

Oleum Picis Rectificatum, **Light Oil of Tar.**

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**).

A distilled oil of Wood Tar, known also as Rectified Spirit of Tar with Sp. Gr. about 0·9, sherry-coloured or reddish; deodoriser, and antiseptic. *Further details in Vol. II.*

Pilula Picis Liquidæ.

Dose.—1 to 5 minims (**0·06 to 0·3 Gm**).

Tar 1, Soap 1, Compound Tragacanth Powder ¼, Licorice Powder 2¾. Useful for winter cough and for hæmorrhoids—best freshly made.

Syrupus Picis Liquidæ, Syrup of Tar, U.S. (1900).

South American *Syn.* JARABE BREA.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Tar 5, wash with water 100; treat residue with the Alcohol 50, add Magnesium Carbonate 10, and Sugar 50, triturate and add Water 400; stir 2 hours and filter. Dissolve sugar 800 in the filtrate by gentle heat and make up to 1,000 with Water.—B.P.C. is similar. Taste may be covered with equal quantity of syrup of wild cherry *q.v.*; Ⓟ $\frac{1}{33}$ to $\frac{1}{10}$ grain of apomorphine hydrochloride may also be added to each dose. Useful in chronic bronchitis and winter cough

Ⓟ **Syrupus Picis cum Codeina. P. Helv.**
Codeine 1, Sugar 505, Tar Water 324, Glycerin 150, Dilute Alcohol 20. *Dose.*—½ to 2 drachms (2 to 8 Cc.).

Unguentum Picis Liquidæ. Tar Ointment (*Off.*).
Contains 70% of Tar in a basis of Beeswax and Lard. U.S. has Tar 50, Yellow Wax 15, Lard 35. Useful in psoriasis.

In chronic dry eczema with much lichenification of the skin, this Ointment is thickly smeared on pieces of lint, and the whole bandaged on to the part and left 24 to 48 hours.

Oleum Cadinum. U.S., P. Helv.—*Syn.* **Juniper Tar Oil. Oleum Juniperi Pyro-ligneum. Huile de Cade.**
By distillation of wood of *Juniperus Oxycedrus* (*Off.*) and some other species (*Coniferæ* or *Pinaceæ*). This oil varies enormously.

For Characters, Tests, and Results of some Experiments see Vol. II.

In most cases of psoriasis a seborrhœa of the scalp will be found. This is well treated with Soap and Water followed by a Salicylic Lotion, Oil of Cade 1 in 5 of Olive Oil and gradually increasing strength till the pure Oil is used.

Oleum Cadini Aceticum.
Acetic Acid 1, Cade Oil 10. This and the former are used for alopecia.

The following are used in psoriasis and dry eczema.

Unguentum Olei Cadini et Sulphuris.
Cade Oil 10, Sulphur 1, Vaselin 15, Lanolin 15.

Unguentum Olei Cadini.
Melt Yellow Beeswax 1, add Huile de Cade 1, and stir till cold. Lard may be used as a diluent if a weak ointment be required.

Unguentum Betulæ Compositum, *St. G. H.* Huile de Cade 10, Resorcin 1, Ichthyol 1, Oil of Sweet Birch 1, Lard 30.

Oleum Fagi Pyroligneum, Beech Tar.
On the Continent used as a source of creosote.

Linimentum Picis (Lassar).
Beech Tar 4, Birch Tar 3, Olive Oil 1, Alcohol (70%) 1.

Oleum Rusci Pyroligneum. Said to be obtained from **Butcher's Broom.** Is really identical with *Oleum Betulæ Pyroligneum,* **Birch Tar.** A yellowish-brown oil from *Betula Alba* (L.).

The above Oils are used instead of Tar in skin affections. The odour of russia leather is due to Birch Tar. They are all miscible with fats, but do not blend perfectly with alcohol.

Huile de Bouleau is obtained by distillation of *Betula Alba.*

Unguentum Rusci Compositum. Birch Tar 30, Calamine 45, Resin Ointment 120, Zinc Ointment 120, Carmine Trituration 4, Liquid Paraffin 15.

Is suitable for chilblains, eczema, prurigo and psoriasis, and for irritation due to piles.

***Resinol** (T.M. 221588) **Ointment and Soap** are Proprietary preparations for skin eruptions and inflammations.

PLUMBUM.

$Pb = 207{\cdot}2$.

Plumbi Acetas. *Syn.* SUGAR OF LEAD, **Saccharum Saturni** $Pb.(CH_3COO)_2.3H_2O = 379{\cdot}306$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Colourless crystals or masses soluble in water 1 in less than 3; in Alcohol (90%) 1 in 30, in Glycerin 1 in 2.

Incompatible with Carbonates, Soluble Chlorides, Sulphates, Tannates, Potassium Iodide and Opium preparations. The *Subacetate* is incompatible with Acacia Mucilage.

Uses.—Astringent, *e.g.*, in severe diarrhœa, and as a hæmostatic (of doubtful value) in gastric ulcer; it is a powerful poison. Externally as lotion for eczema, leucorrhœa, gleet, pruritus and for bruises.

In mercurial stomatitis a wash of Lead Acetate (10 grains to the ounce) may prove soothing.—Yeo.—(? advisable. W. H. M.)

Antidotes.—Emetics or Stomach Tube, Magnesium or Sodium Sulphate followed by stimulants.

Atropine in full doses relieves colic and keeps bowels open.

Plumbic optical neuritis due to poisoning with lead paint treated with Dilute Sulphuric Acid and Saline laxatives, hypodermic injections of Pilocarpine (the latter continued for six weeks), after the first few days Potassium Iodide, 5 grains thrice daily for a child of 8 years.

Potassium Iodide must be used with caution—sudden death may occur due to the entrance of a large amount of soluble lead salt.

Care must be taken to distinguish a Lead line from a Mercurial gum line as in lead workers.—L. ii./12,1138,1166. *c.f.*, Hydrargyrum, pp. 461, 462.

For some details of Lead Poisoning in the Potteries, etc., see Vol. II.

Glycerinum Plumbi Subacetatis (*Off.*).

This is similar to **Goulard's Extract—Liquor Plumbi Subacetatis Fortis** (*Off.*), with glycerin for the solvent in place of water.

Liquor Plumbi Subacetatis Dilutus (*Off.*), is 1 of the Concentrated Liquor with water *q.s.* to 80.

In chronic eczema the Glycerin of Subacetate of Lead is useful. It should first be applied diluted 1 part with about 7 of glycerin, or *better* 1 *with* 7 *of water*, and the strength gradually increased; it desiccates the eruption without producing a hard crust. Some uterine affections are well treated with the diluted glycerole. For inflamed joints after injury to bruised surfaces, lead lotion (warmed) is useful. It should be used with caution to the eyes if the cornea is damaged. In gonorrhœa compresses are used prior to injections.

Liquor (or **Lotio**) **Plumbi Lactatis** is 1 part of Solution of Lead Subacetate to 9 of Milk. A little Eau de Cologne may be added. For nettle rash and any skin irritation.

Leonard Bickle has found Lotio Plumbi of great service in severe burns and did not think any danger from absorption. It was superior to oil dressing. —Dec. 1914.

Unguentum Plumbi Subacetatis (*Off.*).

Strong Solution of Lead Acetate 1 in 8 in a compound basis.

Jelly-fish stings. Apply the following ointment. Lanolin 1, Paraffin Ointment 3, Almond Oil 4, Lime Water 8, Strong Solution of Lead Subacetate 4, Clove Oil $\frac{1}{12}$. Said to be superior to Carron Oil for this purpose.—Brooke.

Injectio Plumbi, R.F.H. Solution of Lead Subacetate 20 minims, Water to 1 ounce. In venereal diseases.

Lotio Plumbi Talci et Amyli. (Formula of BOECK OF CHRISTIANIA). Dilute Lead Subacetate Solution, Talcum, Starch, and Boric Acid Solution (1%) of each 10 by weight, Glycerin 4, Camphor Water 25. Relieves itching.

Lotio Plumbi et Opii.

Tincture of Opium 1 to 159 of Dilute Lead Acetate Solution (1 drachm to 1 pint).

P1 **Solubes Plumbi et Opii** represent:—

Lead Acetate 2 grains, Opium Tincture 20 minims. For dilution with warm water 5 ounces, more or less according to the purpose required.

Opium is said to be entirely devoid of peripheral anæsthetic effects and Lead likewise, because the precipitation of proteids is prevented by the intervention of the epithelium.—P.J. ii./10,298.

Lotio Plumbi Spirituosa. Lead Subacetate Solution 1, Glycerin 2, Alcohol (90%) 4, Rose Water to 32 Has given immediate relief in piles in many cases.

Lotio Plumbi Evaporans, R.O.H.—Diluted Solution of Lead Acetate 4, Alcohol 90% 4, Water to 100.

Plumbi Nitras, $Pb(NO_3)_2$ = 331·22. Colourless or opaque crystals. Soluble in water about 1 in 2.

Ingrowing toenail treated with Lead Nitrate as dusting powder. Remove scab that forms next day. Apply a little strong Phenol first,—this prevents pus which may form.—B.M.J. ii./13,746,939.

Plumbi Carbonas. CERUSSA, **Ph. Ned.** $2PbCO_3,Pb(OH)_2$=775·626. Heavy white insoluble powder, soluble in dilute Acetic and Nitric Acids. Used as dusting powder for burns. 1 to 10% ointment n skin diseases.

Pasta Plumbi cum Cupro.—(A) Lead Carbonate 8 ounces, Mastich Varnish (*q.s.*) about 2 ounces, to make a thin paste. (B) Copper Sulphate, Zinc Sulphate and Lead Acetate of each 40 grains, rubbed together. Mix A and B and add Linseed Oil 1 ounce. This has been used with success in bad cases of erysipelas.—Ph. Notes.

Plumbi Iodidum PbI_2=461·04.

Yellow crystalline powder. Used to reduce swellings. Very slightly soluble in water. 5 to 10% Ointment in skin diseases.

Plumbi Oxidum. *Syn.*—LITHARGE. PbO=223·2.

Yellowish-red powder (Massicot) or scales. To prepare Lead Plasters.

Notes on examination also of plasters made with various Oils.—P.J ii./08,349.

Minium, P. Belg., *Red Lead,* Pb_3O_4=685·6. Made by heating Massicot.

PODOPHYLLIN.

Syn. PODOPHYLLI RESINA.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**) as a cholagogue and aperient pill or tablet. Takes 8 to 10 hours before producing evacuation

The resin from the dried rhizome of *Podophyllum peltatum*—*Berberidaceæ* (*Off.* and U.S.)—American Mandrake, or May Apple, sometimes called Vegetable Mercury as it is a powerful biliary purgative. It is useful in removing *ankylostoma* and other worms. Yellowish powder, soluble in aqueous ammonia and almost completely in 90% Alcohol.

U.S. requires Podophyllin not less than 75% soluble in ether, and not les than 65% in chloroform.

Fluidextractum Podophylli, U.S. 1=1. *Average dose.*—8 minims.

Podophylli Indici Resina (*Off.*). From *P. Emodi* (also now *Off.*). Is richer in Podophyllotoxin than that from *P. peltatum.*

Podophyllotoxin. $C_{20}H_{15}O_6(O.CH_3)_3+2H_2O=480{\cdot}339$.

Is the principal constituent of Podophyllin. It is more certain in its action than Podophyllin and is given in dose of $\frac{1}{10}$ to $\frac{1}{5}$ grain, to children $\frac{1}{60}$ to $\frac{1}{30}$ grain. It is best administered by dissolving 1 grain in 2 drachms of 90% alcohol. *Dose.*—8 to 20 drops in a teaspoonful of syrup.

For further details of this body, see Vol. II.

Ⓟ **Pilula Podophyllin Composita.**

Podophyllin $\frac{1}{4}$ grain, Barbadoes Aloes 1 grain, Capsicum $\frac{1}{2}$ grain, Green Extract of Belladonna $\frac{1}{4}$ grain, Excipient *q.s.* for one pill weighing 3 grains. One or two form a biliary aperient dose.

Ⓟ **Pilula Podophyllin et Quininæ (Poore's Pill).**

Quinine Sulphate 1 grain, Podophyllin $\frac{1}{12}$ grain, Milk Sugar $\frac{1}{12}$ grain, Green Extract of Belladonna $\frac{1}{6}$ grain, Extract of Aloes 1 grain. To make one pill, or, if the quantities be taken in grammes, 15 pills, weighing 3 grains: useful 'dinner pills,' must be taken *with* food.

Ⓟ **Dinner Tablets** are similar; weigh 3 grains. They are recommended not coated for prompt action.

Ⓟ **Pilulæ Podophylli, Belladonnæ et Capsici,** U.S. VIII.—100 pills contain Podophyllum Resin 1·6 Gm.; Extract of Belladonna leaves 0·8 Gm., Capsicum 3·2 Gm., Sugar of Milk 6·5 Gm., Acacia 1·6 Gm., Glycerin and Syrup *q.s.*

Tinctura Podophylli (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Podophyllin 3·65% in Alcohol 90%.

Flavoring.—Syl Lavandulæ (double dose), Syl Amygdalæ Amaræ; Syrupus Zingiberis, Elixir Saccharini.

In dose of 2 to 4 drops in tea or coffee, taken night and morning, is useful in sick headache and biliousness, where the bowels and liver are sluggish in worried and overworked patients, and in chronic diarrhœa with cutting pains and high-coloured motions. Also relieves constipation with clay-coloured motions following diarrhœa of infants, 1 or 2 drops on sugar twice or three times a day.—R.

Tinctura Podophylli Indici (*Off.*) is also made same strength.

Tinctura Podophyllin Ammoniata.

Podophyllin 1, Aromatic Spirit of Ammonia 50. Dissolve and after standing, decant. Is miscible with water.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**), diluted, as a purgative and cholagogue. The sal volatile acts as a corrective.

***Chologen** (T.M. 253036) **Tablets** are given to dissolve gall stones and check cholelithiasis. Supplied in 3 strengths:—

(i.) Calomel $\frac{1}{12}$ grain, Podophyllin $\frac{1}{6}$ grain, (ii.) Calomel $\frac{1}{20}$ grain, Podophyllin $\frac{1}{12}$ grain, (iii.) Calomel and Podophyllin $\frac{1}{25}$ grain each, also Camphor $\frac{1}{25}$ grain and small doses of Caraway Oil and Balm (Melissa) Oil.—Gehe. To be taken over lengthy periods.

POTASSIUM.

$K=39{\cdot}10$.

Sources of Potash Salts.—Potassium Chloride is obtained from the Strassfurt mines, also as *Sylvine* at Mulhouse in Alsace, and could be worked commercially from Fellspars in Scotland.—Sir T. E. Thorpe, B.M.J. i./18,64.

Potassa Caustica, Potassii Hydroxidum. $KOH=56{\cdot}108$.

Manufactured by interaction of Potassium Carbonate and Calcium Hydroxide. White deliquescent sticks or cakes. (*Off.*) not less than 85% pure. ***Soluble*** in water 2 in 1, and about 1 in 3 *w/v.* of 90% alcohol.

Incompatibles—Acids, metallic salts, and alkaloidal salts.

Antidotes.—Any dilute vegetable acid, fixed oils, stimulants; not stomach pump or lavage.

Given in mixtures as **Liquor Potassæ** (*Off.* 5% *w/v.*), well diluted also used as a caustic.

A Liquor containing 5 Gm. of KOH in 100 Cc. has Sp. Gr. 1·045. P.G V is 15% *w/w.* Sp. Gr. 1·138 to 1·14.

Flavoring.—Syl Menthæ Piperitæ, Syl Amygdalæ Amaræ.

Liquor Alkalinus, Brandish.

Dose.—For adults 3 drachms. For ages 14 to 18 years 2 drachms, for children ½ to 1 drachm diluted, *e.g.*, in syrup.

This liquor consists of a 5% Aqueous Caustic Potash. In scrofula.—Hager.

Potassa Sulphurata (*Off.*). Liver of Sulphur. Deliquescent yellowish brown masses, smelling of sulphuretted hydrogen. Used in skin affections. **Balneum,** 2 ounces to 15 gallons.

Vienna Paste.—Caustic Potash 5, Slaked Lime 6, made into a paste with Alcohol. Used as an escharotic.

The total Sulphur should be estimated. The 1898 B.P. product would contain 42 to 45%.—D. L. Howard, P.J. ii./12,150,222. This is now *Off.*—estimated as Barium sulphate.

Unguentum Potassæ Sulphuratæ. Liver of Sulphur 1, Sodium Carbonate 1, Lard 8. For ringworm.

Potassii Acetas. $CH_3COOK=98{\cdot}134$.

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**).

Deliquescent white crystals, masses or powder. Antilithic, diuretic and uric acid solvent. Soluble in Water 2 in 1, in Alcohol (90%) 1 in 2.

Flavoring.—Syl Pini, Syl Lavandulæ, Syrupus Aurantii.

To prevent puerperal eclampsia. Keeps the urine alkaline if given in sufficient dose, but will not cure the albuminuria; it does, however, prevent eclampsia.—B.M.J. ii./09,550.

Mistura Diuretica, **St M.'s H.**

Potassium Acetate 20 grains, Sodium Nitrite ½ grain, Spirit of Juniper ½ drachm, Tincture of Ginger 10 minims, Water to 1 ounce.

N. H. W. has Potassium Acetate 20 grains, Solution of Ammonium Acetate 2 drachms, Vinegar of Squill 20 minims, Infusion of Broom 2 drachms, Water ½ ounce.

Potassii Benzoas. $C_6H_5COOK.3H_2O=214{\cdot}223$.

Dose.—15 to 20 grains (**1 to 1·2 Gm.**). White crystals. Soluble in water 1 in 1½ and in alcohol (90%) 1 in 20. Uric Acid Solvent.

Flavoring.—Syl Aurantii Floris, Syl Vanillæ; Syrupus Aurantii.

Potassii Bicarbonas $KHCO_3=100{\cdot}113$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White powder or crystals soluble 1 in water 4. Insoluble in Alcohol (90%). Antacid, diuretic, and Uric Acid solvent. It is most valuable in acute rheumatism.

Endocarditis is benefited by free administration, *e.g.*, 1 drachm doses in solution added to fresh lemon juice.—Whitla.

Flavoring.—Syl Cinnamomi, Syl Lavandulæ; Syrupus Aurantii.

Potassii Bichromas. $K_2Cr_2O_7=294{\cdot}2$.

Dose.—$\frac{1}{10}$ to $\frac{1}{5}$ grain (**0·006 to 0·012 Gm.**), in pill with Kaolin Ointment or in Capsule has been used in dyspepsia and gastric ulcer. —Soluble 1 in 10 of water.

Antidotes. See **Antidotes to Poisons.**

Cancer has been treated by injections of 8 to 15 minims of 10% solution. Also local use of this solution.—B.M.J. i./09,589.

In phthisis (2½ minims of 10% Solution in water) either alone or in a tonic mixture in a wineglass of water after food, at first twice and later three times daily, produced improvement in several cases. May produce vomiting at first.—L. ii./10,1484. Poisoning by.—L. ii./07,1758.

Potassii Bromidum, $K\,Br=119{\cdot}02$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

Colourless or white crystals with saline taste. Soluble in water 1 in less than 2, and in about 200 of alcohol 90%. It should be at least 97% pure.

Incompatible with Mineral Acids, Mercury and Silver Salts.

Flavoring—Glyl Rosæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Hypnotic and sedative, and is given as a drink cure. Often given with other bromides, *c.f.*, Sal Bromatum, and with Chloral Hydrate, Arsenic or Belladonna.

Potassium Bromide with Nux Vomica will keep a patient free from epileptic fits whilst treatment is persisted in.—L. i./10,355.

In recent epilepsy should be given for a long period (not less than two years). If no benefit from 45 to 75 grains per diem some other remedy should be tried. (It is cumulative). Addition of Belladonna may be useful where there is incontinence. Also useful with Nux Vomica.

In confirmed epilepsy with mental deterioration. The useful dose may approximate the toxic.

The following mixture has been recommended :—

Potassium Bromide 1 ounce, Potassium Iodide 2 drachms, Ammonium Bromide 3 drachms, Ammonium Carbonate 1 drachm, Tincture of Calumba 1 ounce, Water to 6 ounces. One teaspoonful before each meal and three teaspoonsful at bedtime. If *petit mal* exists alone, or co-exists with complete epilepsy the dose of Ammonium Bromide must be increased and that of the other diminished.

To avoid the onset of Bromism give Fowler's Solution of Arsenic, and maintain the antisepsis of the bowels by purgatives and salol.

For erections in gonorrhœa 15 to 35 grains with Lupulin 1 to 2 grains and Camphor 1 to 2 grains in a cachet, two to four daily.—Pr. Apl. '09,543.

Patients saturated with Bromides exhibit anæsthesia of the palate —a little known but useful diagnostic. Tickling the palate with a feather is a good means of eliciting the information. The effect of Bromides is enhanced by adding Potassium Bicarbonate in doses equal to about a quarter of the total Bromide given.—Craik Taylor.

Small doses, *e.g.* 5 grains once a day long continued is far more efficacious than larger doses for shorter periods.—M. Craig, L.ii./17, 979.

Puerperal eclampsia is treated with it combined with Belladonna.

Tablets contain 5 and 10 grains.

Ⓟ**Mistura Dysmenorrhœica, N.H.W.**

Potassium Bromide 15 grains, Sal Volatile, Tincture of Hyoscyamus *a.a.* ½ drachm, Spirit of Chloroform 10 minims, Water to ½ ounce.

Elixir Quinque Bromidorum. Can. Form.

Potassium and Sodium Bromides of each 10, Ammonium Bromide 6, Calcium Bromide 3, Lithium Bromide 1, Tincture of Cannabis Indica 6, Aromatic Elixir, sufficient to make 120. Dissolve the Bromides in the aromatic elixir, add the Tincture of Cannabis Indica, and filter if necessary. *One drachm contains* 15 *grains combined Bromides.*

Potassii Carbonas.

Syn. SALT OF TARTAR. K_2CO_3=138·205. *Dose.*—5 to 20 grains **(0·3 to 1·2 Gm.).**

White deliquescent powder. Soluble in water 4 in 3, insoluble in alcohol 90%. Employed chiefly as lotion externally ; internal properties similar to those of the Bicarbonate. Commercially contains about 16% H_2O.

Potassii Chloras. $KClO_3$=122·56.

Dose.—5 to 15 grains **(0·3 to 1 Gm.).**

Manufactured by passing chlorine into water holding lime or magnesia in suspension, treating the clarified liquid with Potassium Chloride, and crystallising the resulting chlorate from the liquor. Colourless crystals with saline taste. ***Soluble*** in water 1 in 16

Incompatible with Oxidisable substances, Ferrous Salts, Sugar, Nitrites, Calomel, Hypophosphites, Vegetable Powders, Potassium Iodide.

Uses.—Antiseptic and a powerful oxidising agent. Is useful in stomatitis *e.g.* in children and in sore mouth arising from Mercurial treatment. Must not be given when the kidneys are diseased.

Poisoning by 20 Gm. Transfusion of defibrinated human blood tried. Death.—L.ii./07,1175.

Habitual natural abortion treated by Potassium Chlorate—successful. The oxidising effect may assist to prevent or limit the production of the so-called toxæmia in pregnancy.—L. i./11,1222.

Water sterilisation for troops by Chlorine liberated from, *vide Vol. II.*

Lozenges, Tablets, plain and with Borax and Cocaine, are useful to allay irritation and improve the voice. Gargle, spray, mouth wash may be 2% strength. Chlorine Gargle is made from it.

Pulvis Potassii Chloratis Compositus, C.L.T.E.

Potassium Chlorate 1, Borax 1, Sodium Bicarbonate 1, Sugar 2. Forms the solids of :—

Collunarium Potassii Chloratis Compositum, C.L.T.E.

Directions.—One teaspoonful to be dissolved in a quarter pint (½ tumbler) of tepid water. Half of the solution to be injected with a syringe along the floor of each nostril night and morning. Afterwards blow the nose freely.

Chloratifrice, a tooth paste, contains this Salt. For spongy gums and to prevent Tartar and act as a general antiseptic.

Potassii Chloridum. $KCl = 74·56$.

Has been advocated for use in place of table salt by gouty and rheumatic individuals; the following is better to taste :—

Pulvis Potassii et Sodii Chloridi Compositus.—*Oliver.* Potassium Chloride 16, Sodium Chloride 8, Lithium Benzoate 1. A half-drachm measureful to be taken.

The late Sir W. Roberts advocated Potassium Chloride for increased arterial pressure. Oliver found a tendency to indulge in the use of salt in advancing age (over 65). When Potassium is ingested in excess of Sodium, a loss of the latter takes place from the system.

Potassii Citras. $C_3H_4(OH).(COOK)_3$, H_2O = 324·386.

Dose.—15 to 60 grains (**1 to 4 Gm.**).

A white powder obtained by neutralising citric acid with potassium carbonate. It has diaphoretic, diuretic, and febrifuge properties. Also for gout, and in enuresis where the urine is over-acid.

Potassium Citrate has the peculiar property of dividing Aqueous Alcohol solutions into layers consisting of more or less pure alcohol in the upper and aqueous salt solution in the lower.

Flavoring.—Syl Anisi, Syl Sassafras; Elixir Saccharini; Syrupus Pruni Virginianæ.

Removes œdema in disease of the gastro-intestinal tract in infants. Appears to act better than other diuretics.—Pr. May, 1911, p. 686.

Neurotic dyspepsia. Sip early in the morning a tumbler of hot water containing a teaspoonful of it.—B.M.J. ii./11,1529.

Lactation improved by 15 grain doses.—B.M.J. i./17,765.

'Vescettes' of Potassium Citrate, 15 grains.

To be crushed and taken in a draught of warm water.

P I **Potassii Cyanidum** $KCN = 65·115$. Fr. Cx.

Dose.—$\frac{1}{12}$ to ¼ grain (**0·005 to 0·016 Gm.**).

Fr. Cx. has *max. single dose* $\frac{1}{6}$ grain. Max. during 24 hours $\frac{5}{8}$ grain.

A crystallised salt or in fused masses.

Antidotes.—See Acid Hydrocyanic.

P1 Trade Varieties. In addition to the B.P. salt (about 95% pure) are '**Gold Cyanide**' 98 to 100%, really a double Cyanide of Potassium and Sodium, but, we understand, the B.P. article is also used for gold extraction. 30% pure is supplied in sticks; this is 'silver cyanide,' for silver extraction.

Potassii Ferrocyanidum.

$K_4Fe(CN)_6,3H_2O = 422·378$. *Dose.*—8 grains (**0·5 Gm.**).

Said to be physiologically almost without action.—P.J. ii./05,924.

Potassii Iodidum. KI = 166·02. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**)—often much increased.

In white or colourless cubic crystals or **Small Granular Crystals** soluble in less than its own weight of water, and in 12 parts of Alcohol 90%.

A slightly alkaline solution keeps better than an acid one. ***Incompatible*** in solutions with Spiritus Ætheris Nitrosi, Salts of Iron (except Ferri et Ammonii Citras and Liquor Ferri Acetatis), Salts of Bismuth, Lead and Mercury, with Liquor Strychninæ Hydrochloridi, with Quinine Sulphate and other alkaloidal Salts, Silver Nitrate and Potassium Chlorate.

Flavoring.—Syl Lavandulæ, Glyl Menthæ Piperitæ, Syl Vanillæ, Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Uses.—In universal use in the later stages of syphilis, in arteriosclerosis and certain cases of gout and rheumatism.

For actinomycosis it is specific; very large doses are given. In one case (severe) it was only when the dose reached 240 *grains daily* that *improvement began.* Carbolic Lotion 1 in 80 was quite sufficient locally. Thomassen's Method is 10 grains thrice daily for the first *week*, 15 grains the second, and 20 grains the third, increased to 35 grains.

Sporotrichosis and blastomycosis, also respond to Potassium Iodide.

Rheumatoid arthritis best treated by 10-grain doses thrice daily with Guaiacol Carbonate.—A. P. Luff, Pr., July, '05; *see* also p. 377.

In fibrositis it is perhaps the most valuable drug. It appears to act by removing the hyperplasia and serous exudation in the fibrous tissues. Full doses (10–12 grains) with Nux Vomica or Syrup of Glycerophosphates.—A. P. Luff, B.M.J. i./13,758; ii./13,858.

In exophthalmic goitre it is *to be avoided.* Iodine is being poured into the system in excess by thyroid secretion.—B.M.J. ii./05,1249.

Goitre and Iodine compounds. The best effects of Iodine on the thyroid are only obtained by doses much smaller than those usually employed.—B.M.J.E. ii./08,12.

A case of Thyroid enlargement not goitre; rapid resolution under Iodide. Interesting in that Iodides often cause enlargement of the thyroid gland.—B.M.J. i./09,1064.

In asthma, Potassium Iodide in 5–15 grain doses twice or thrice daily. Extract of Stramonium may be added. Reliable both during the paroxysms and in the interval.—Yeo.

In aneurism moderate to full doses.—Yeo. The addition of Ammonium Bromide is often useful.

In raised arterial tension where source of danger, 1 to 10 grains thirce daily for fortnightly periods with intervals of a week beneficial. —Brunton.

In arteriosclerosis 3 to 5 grain doses thrice daily with Potassium Bicarbonate 5 to 10 grains, Sal Volatile 20 minims, and an ounce of Gentian Infusion continued for four months at a time with interruptions of ten or twelve days. One or two tablets of Nitro-glycerin as well to promote vascular relaxation.—Yeo.

In dry forms of disease of the middle ear.—B.M.J. ii./04,1206,1209.

In tinnitus aurium associated especially with vertigo, due to labyrinthine disease, may be used in large doses.

Acute parotitis favourably treated by painting the swelling with Iodine and giving Potassium Iodide internally.—B.M.J. i./06,81.

Tuberculous expectoration is greatly assisted by its use.

In lobar pneumonia for the combined use of Potassium Iodide and Creosote, *vide* **Mistura Creosoti et Potassii Iodidi**, p. 371.

In bronchial affections the Iodides cause a watery exudation through the bronchial mucous membrane. They are excreted through this and other mucous membranes. In some cases Iodine itself is liberated, leading to 'iodism' —the result is a bathing of the infected membrane with healing muco-serum. —P.R.S.M., Therap., Sect—1911, p. 41.

Sterules, Hypodermic, of **Potassium Iodide** contain 5 grains.

Pilula Potassii Iodidi.—Contains 1 grain or more.

Potassium Iodide 1 grain, Sodium Carbonate Exsiccated ⅛ grain, with Tragacanth and Syrup. **Tablets** and **Capsules** contain 5 grains.

Potion Iodurée.

Potassium Iodide 0·5 Gm., Syrup of Orange 25 Gm., Distilled Water 100 Cc., to be taken in three portions during the day.

Spirone Inhalant (*Churchill's*)

Pharm. Form. says.—A solution of Potassium Iodide in a mixture of Acetone 1, Glycerin 2, and Water 13. The Iodide is in the proportion of about 8 grains to the ounce. For use in phthisis.

Linimentum Potassii Iodidi cum Sapone (*Off.*).

Mix fresh Curd Soap in fine shreds 16 with Water 80, and Glycerin 8, in a porcelain dish on a water bath. When dissolved, pour the liquid on to Potassium Iodide 12 in powder in a mortar. Triturate briskly until cold. Set aside 1 hour; and add Lemon Oil 0·8.

A soft **jelly-form Liniment of Potassium Iodide and Soap** may be produced with Soft Soap ½, Potassium Iodide 1½, Glycerin 1, Water 10. The following is somewhat stiffer: Soft Soap 1, Potassium Iodide 1½, Glycerin 1, Water 10.—P.J. ii./04,376.

Potassii Nitras KNO_3=101·11. *Syn.* NITRE. *Dose.*—5 to 20 grains (0·3 to 1·2 Gm.).

Flavoring.—Syl Rosæ, Glyl Lavandulæ, Syrupus Tolutanus.

In chronic pericarditis great alterations in the area of dulness may follow the employment of diuretics such as preparations of Potassium Nitrate, Squill, Digitalis or Scoparium.—Tirard, Med. Treatment.

In pneumonia all the free chloride in the body is held by the exudate. The chloride content of the body is called upon, and the urine becomes almost salt free. At the crisis the exudate is liquefied and chlorides reappear in the urine. The sudden liberation of chlorides into the circulation seems to conduce to heart failure and fatalities. The crisis should be hastened, and the sudden outpouring of chlorides be made more gradual. Sodium chloride can be displaced by sodium bicarbonate, neutral potassium phosphate and potassium nitrate. Potassium nitrate in full doses causes the sodium chloride to reappear in the urine in a few hours, and to continue present so long as it is given. The diet should be salt-free. The effect is remarkable; temperature falls in a few hours. Give 60 grains in solution every 3 hours for the first day, and then gradually reduce the dose each succeeding day. To increase circulation in the lungs nitroglycerin $\frac{1}{100}$ to $\frac{1}{50}$ gr. every three hours.—H. G. Hughes, N. Y. M. Jl., Sept. 9, 1911, Pres., Dec., 1911, p. 300.

Poisoning by Potassium Nitrate.—B.M.J. i./11,1,052.

Antidotes. See **Poisons** and **Antidotes.**

Fumus Potassii Nitratis (Nitrated Papers).

White blotting-paper, impregnated with 20% Nitre solution. To relieve asthma these are burnt and the fumes inhaled.

Asthmatic Pastilles are prepared in cones containing a mixture of chlorate and nitrate of potassium.

Pulvis Lobeliæ Compositus. ASTHMA POWDER.

Potassium Nitrate 240, Boiling Distilled Water 240. Dissolve and add to Lobelia in powder, Stramonium Leaves in powder, Black Tea in powder, 240 of each. Mix well, dry, and add Oil of Anise 1. The fumes of half a teaspoonful or more to be inhaled six or eight times a day and the bedroom fumigated with same. ✱Himrod's Cure (T.M. See 169033 and 25857) Bliss's Cure, and the Green Mountain Cure resemble the above.

Asthmatic Cigarettes contain Stramonium treated with Nitre.

P1 **Cigarettes d'Espic** are said to be made of the following ingredients:—Belladonna Leaves 5½, Hyoscyamus Leaves 2¾, Stramonium Leaves 2¾, *Phellandrium Aquaticum* 1, Opium Extract 1⅓, Cherry Laurel Water a sufficiency, and a little Potassium Nitrate.—Yeo.

Anasarcin Elixir. *Dose.*—4 drachms (**15 Cc.**) every two hours.

An American preparation stated to contain *Sambucus canadensis*, *Oxydendron arboreum*, *Hepatica americana* and potassium nitrate. As a diuretic cholagogue and antiasthmatic. **Anasarcin Tablets**, *Dose.*—½ to 2 thrice daily. Weigh 10 grains approximately and are chocolate-coated.

Effervescent Potassic Aperient.

Dose.—One drachm in half a tumbler of warm water.

A preparation containing **Potassium Sulphate*** $K_2SO_4=174{\cdot}27$ Suggested as an alternative to Sodio-Magnesian Aperient (*q.v.*) also prepared with **Potassium Sulphocarbolate** 10 grains in a *dose* as (above). Useful where gastric and intestinal fetor are present.—Colin Campbell.

Foul smelling evacuations treated by Calomel ⅙ to ¼ grain at night followed in the morning by a dose of this.—H. J. Thorpe, B.M.J. ii./12,344.

Potassii Nitris. $KNO_2=85{\cdot}11$.

Dose.—¼ to 1½ grains (**0·016 to 0·1 Gm.**).

A crystalline deliquescent powder. It is a vasodilator, improves the cerebral circulation and is given for migraine, asthma and epilepsy.

Pulvis Potassii Nitritis Compositus.

Potassium Nitrite ½ grain, Potassium Nitrate 18 grains, and Potassium Bicarbonate 25 grains; mix and dispense in parchment paper.

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* Potassium Sulphate 0·25 to 0·5% added to local anæsthetics whether by spinal injection or peripheral blocking of nerves enhances anæsthesia.—Col. H. M. W. Gray, B.M.J. i./16,5

This dose may be given every morning in a tumbler of water to reduce blood pressure; is diuretic. Has thus checked recurrent epistaxis. Should be tried for gout.—L. ii./02,331.

Pulvis Sodii Nitritis Compositus.—Brunton.

Sodium Nitrite ½ to 2 grains, Potassium Nitrate 10 to 20 grains, and sometimes Potassium Bicarbonate 10 grains—in a tumbler of water every morning—to reduce blood pressure. May be taken for years.

Potassii Phosphas. **Di-potassic Hydrogen Phosphate.**

$K_2HPO_4=174{\cdot}248$. *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**).

A deliquescent granular powder; is given as an alterative in phthisis and urinary affections

Sal Polychrestum. *Syn.* **Glaser's Salt.**

Dose.—30 to 120 grains (**2 to 8 Gm.**).

A mixture of Potassium Sulphite and Sulphate, has a sulphurous odour, has been given for dyspepsia and for chronic skin diseases.

Sal Enixum is Potassium Bisulphate. $KHSO_4=136{\cdot}168$.

Potassii Sulphocyanas (Sulphocyanide). $KCNS=97{\cdot}175$.

Dose.—¾ to 3 grains (**0·05 to 0·2 Gm.**). Not legally $\boxed{\text{P1}}$ or Ⓟ but to be supplied with caution.

Has been employed as antispasmodic and anodyne—in phthisical cough and catarrh, dyspnœa, and mania.—M. Am.

Tooth Powders, Pastes and liquid Dentifrices. Suggested use of this or other alkaline sulphocyanide in neutral media. For powder 1 to 14 of precipitated chalk. For liquid dentifrice 1 to 8 of alcohol. Subject of patent,—F. J. Rhodes, No. 20879 of 1914.—P.J. ii./15,362.

Potassii Tartras.—**Normal or Neutral Potassium Tartrate.**

$(CHOH)_2COOK.COOK,\ \frac{1}{2}H_2O. = 235{\cdot}260$.

Dose.—30 to 240 grains (**2 to 15 Gm.**).

Crystalline powder with bitter taste made by neutralising Acid Potassium Tartrate with Potassium Carbonate. Has purgative and diuretic properties.

Soluble.—About 5 in 3 of water.

Potassii Tartras Acidus. (*Off.*)—*Syn.* **Potassii Bitartras.** PURIFIED CREAM OF TARTAR. $(CHOH)_2COOK.COOH=188{\cdot}16$.

Dose.—15 to 60 grains (**1 to 4·0 Gm.**).

The crude tartar deposited during the fermentation of wine—recrystallised. A white powder with acid taste soluble 1 in 200 of water. Diuretic and cathartic. Is employed in acute renal disease. Where the urine is thick and alkaline, this salt neutralises and produces normal appearance.

Puerperal eclampsia. The convulsions may be the signs of œdema of the brain, hence aim at treating the œdema rather then the defect of the kidneys. Very small frequent doses of Potassium Bitartrate caused increased diuresis in a case and effected cure of eclampsia.—B.M.J.E. i./13,70; B.M.J. i./13,1207.

Haustus Imperialis, K.C.H., **Imperial Drink.** Potassium Bitartrate and Tartaric Acid of each 1 ounce, Sugar 16 ounces, Lemon Oil 12 minims, Boiling Water 1 gallon.

Carbuncle on the neck was treated by Cream of Tartar Powder as a dressing. Renewed from time to time and irrigated with sterile water.

Potus Imperialis, G.N.C. Lemon Syrup $1\frac{1}{2}$ ounces, Acid Tartrate of Potassium 1 drachm, Water to 20 ounces.

Potassii Boro-Tartras. SOLUBLE CREAM OF TARTAR.

Dose.—20 to 40 grains (**1·2 to 2·5 Gm.**).

An amorphous white powder. Potassium Acid Tartrate 5, Borax 2. Dissolve with heat in water, *q.s.*, and evaporate to dryness.

Soluble to extent of 1 in 1 of water.

Use.—Similar to that of Cream of Tartar.

QUININA.

FR. CX., P. HUNG., P. SVEC., U.S.

$C_{19}H_{20}N_2O.CH_3.OH + 3H_2O = 378·360$ **Ph. Ned.** is anhydrous.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) or more (if anhydrous, 3 parts equal approximately 4 of sulphate). *Antimalarial Dose* (*U.S.*) *at least* 15 *grains daily.*

Quinine base can be produced with 1, 2 or 3 H_2O.

It forms additive compounds with Hydrocarbons, *e.g.*, 1 molecule Quinine + 1 molecule C_6H_6. A body has also been made consisting of 2 molecules Quinine, 1 molecule Hydrocarbon and $2H_2O$. Combinations with Amyl Acetate, Ethyl Acetate, Toluol, Dimethylaniline and Nitrobenzol also with Essential Oils, *e.g.*, Lavender, Pine, Rosemary, also with Terebene, Terpineol have been made.—Schaefer, 8th Int. Cong. App. Chem., N.Y., Sept., 1912.

The most valued cinchona alkaloid, a bitter, white powder.

Quinine as an economic weapon.—Amongst all the Allies the call for Quinine was almost desperate—especially in the Italian Forces—in fact the allied cause was in jeopardy. It is scarcely too much to admit that the future destiny of the civilised world rested with the Dutch. The keynote of the situation was the Java Cinchona plantation. The famous War Agreement of September 3rd, 1918, saved the situation—the Associated Countries secured practically the whole year's production of Java Quinine on reasonable terms.—"X.F.O." C.D. '19,1065.

Soluble.—Very slightly in water, 1 in 40 of ether and about 1 in 1 of alcohol 90%, also in dilute acids, 1 in 3 of chloroform, and in aqueous ammonia. Antipyrin increases its solubility in water. Its solution in diluted sulphuric acid is fluorescent, lævogyrate, and gives, with chlorine water and ammonia afterwards added, a green colour due to **Thalleioquin.**

Quinine is not so bitter as its salts, hence may well replace them.

Malaria in children is well treated with it. It is readily absorbed by the acid of the stomach, and quite as effective as the salts.—Jl. Trop. Med., Nov. 15/09,336.

It can be detected in the urine 10 minutes after taking.

In wasting diseases, *e.g.*, tuberculosis. Quinine retards protein breakdown and may be prescribed with advantage.—Pr. Jan., 1913.

Acidum Quinicum. *Syn.* KINIC ACID.

$C_6H_7.(OH)_4COOH + H_2O = 210·147.$

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

An acid contained in Cinchona, principally combined with the alkaloids and with calcium, forms white crystalline masses, soluble in water about 5 in 6, and in alcohol 90% 1 in 35. It is decomposed into hippuric acid in the system. In gout and rheumatism.

✱**Urosin** (T.M. 216166) **Tablets** 8 grains, contain **Lithium Quinate** (Patent 27333/1898 now void); one several times a day for gout.

The Patent Specification gives formulæ for Pastilles and Effervescing Powder: (i.) Quinic Acid (or its salts) 100, Magnesia 5, Lithium Citrate (or other salt) 33, Sugar 66. (ii.) Quinic Acid 100, Lithium Carbonate 16, Sugar 84. Efficacy doubted.—P.J. i./17,295.

P1 **Quininæ Arsenas.** $2(C_{20}H_{24}N_2O_2).\ H_3AsO_4+8H_2O = 934{\cdot}736$.
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).

Small white crystals, sparingly soluble in water. It is an antiperiodic, given in chronic malarial fevers. Contains about 15·2% of arsenic acid, and 69·4% of quinine.

Quininæ Camphoras.
$2(C_{20}H_{24}N_2O_2).C_8H_{14}(COOH)_2=848{\cdot}802$. *Dose.*—1 to 10 grains. An insoluble powder. 76·4% quinine.

Quininæ Citras.
$2(C_{20}H_{24}N_2O_2).C_3H_4.OH(COOH)_3+7H_2O = 966{\cdot}830$.
Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Soluble 1 in 900, has, therefore, little taste. Given suspended in mixture. Contains 67·1% Quinine.

Effervescent Quinine Citrate. *Dose.*—1 drachm. Contains 1 grain.

Ferri et Quininæ Citras (*Off.*)
Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) in solution, or in pills with simple syrup or mucilage of acacia (not in excess, as, unless made very hard, they lose shape). Alcohol 60% with Glycerin 5% is also a suitable excipient. Contains about 15% of quinine, in greenish deliquescent scales. It has an agreeable bitter, chalybeate taste. Largely used as a general tonic.

Incompatible with Tannin and Alkalis, also with Phosphoric Acid (Ferric Phosphate may be thrown out), unless considerably diluted prior to mixing.

Flavoring.—Glyl Vanillæ, Glyl Menthæ Piperitæ (bold dose) Syrupus Zingiberis.

Effervescent Citrate of Iron and Quinine.
Dose.—1 drachm (**4 Gm.**) = 3 grains of the salt.

Tablets of Iron and Quinine Citrate 3 grains.

Syrupus Ferri et Quininæ Citratis.
Dose.—1 drachm (**4 Cc.**). 1 in 20 of Orange Syrup.

P1 **Ferri, Quininæ et Strychninæ Citras** (*q.v.*) contains 1% of Strychnine.

Ⓟ **Sirop Neurotonique.**
Dose.—2 to 3 drachms (**8 to 12 Cc.**) in a little water after meals. Iron and Quinine Citrate 0·50, Strychnine Nitrate 0·01, Liquid Extract of Kola 5·0, Sodium Glycerophosphate 5·0. Dissolve with slight heat in Orange Syrup, *q.s.*, to 100.

Quininæ Formas Acidus ("Neutral" in France).
$C_{20}H_{24}N_2O_2.(H.COOH)_2=416{\cdot}354$.
Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).
Long white needles containing 77·9% Quinine, M.Pt. 95° C.

Quininæ Formas Neutralis (" **Basic** " in France). *Syn.* CHINOFORM, QUINOFORM. $C_{20}H_{24}N_2O_2.HCOOH=370·333$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**). Subcutaneously 1 to 3 grains. (Stated not to be painful.)

C. H. Hampshire and W. R. Pratt find Commercial specimens contain $1H_2O$ (also a salt prepared by themselves).—P.J. ii./13.141.

Prepared by using a very small quantity of water, in which the Quinine is placed and the acid added. Crystals melting at 132°; lævorotatory. Contains 87·5% Quinine. A general tonic. Suitable for hypodermic use.

Solubility.—Varies according to conditions of manufacture. Some commercial samples we found were only soluble in 600 of water and 110 of Alcohol. We found that a 1 in 20 solution can be made extemporaneously by dissolving 1 gram of the base in 19 Cc. of water containing 0·125 gram of Formic Acid, but we could not make the salt more soluble than 1 in 45 of water and 1 in 7 of Alcohol, there being dissociation.

Sterules, Hypodermic, contain $\frac{1}{3}$ grain (**0·02 Gm**). and $\frac{3}{4}$ grain (**0·05 Gm.**).

Guttæ 1 in 50 have been employed satisfactorily in asthenopia.

Quininæ Hydrobromidum, U.S., FR. CX.—'Basic' Quinine Hydrobromide. P. HELV. **Quinine Bromide.**

$C_{20}H_{24}N_2O_2.HBr+H_2O=423·256$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more.

White acicular crystals, soluble 1 in water 40. (P. Helv. 60.)

Contains 76·6% of Quinine. Quinine is given with an excess of hydrobromic acid to lessen the cinchonism sometimes caused by large doses. Is valuable in acute rheumatism. In malaria for oral administration, hypodermically or intravenously.

Exophthalmic goitre has been well treated by 5 grain Capsules given to the limit of tolerance (3 or 4 Capsules *p.d.*)—for months or even years. In many cases the thyroids diminish in size—the exophthalmos seems to be the last to disappear—this may take years. The Quinine probably acts on the sympathetic system.—Boston Med. and Surg. Jl., Sept. 15,10 *per* Pres. Dec. 10,215.

Tablets contain 3 and 5 grains, also 3 grains, **with Phenacetin,** 5 grains. **Hypodermic Tablets** of the Salt $\frac{1}{2}$ grain.

Tropical abscess, a case of, treated by aspirating and injecting into the cavity 1% solution of this Salt.—B.M.J. ii./08,1812.

Quininæ Hydrobromidum Acidum. (FR. CX.—'Neutral.')
$C_{20}H_{24}N_2O_2.2HBr+3H_2O=540·226$.

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) hypodermically.

In yellowish rectangular prismatic crystals, or in powder. Contain 60% of Quinine. *Soluble* 1 in 7 of water, and is well adapted for hypodermic injection. It is entirely unirritating. The additional hydrobromic radical tends to prevent quinism.

Sterules, Hypodermic, contain 2 grains (**0·12 Gm.**) each.

Injectio Quininæ Hydrobromidi Acidi Hypodermica. 1 grain in 6 minims. *Dose.*—3 to 12 minims (**0·2 to 0·8 Cc.**).

Used where quinine cannot be borne by the stomach. In malarial fever and subsequent rheumatism.

Quininæ Hydrochloridum. *Off.* FR. CX. 'Basic,' U.S., P. HELV., P. JAP., P. HUNG. *Syn.* QUININE HYDROCHLORATE.
$C_{20}H_{24}N_2O_2.HCl+2H_2O=396·812$.

Dose.—1 to 10 grains (0·06 to 0·6 Gm.).

In acicular crystals. Contains 81·7% base against 73½% in the sulphate.

Soluble 1 in 40 of water, 1 in 3 of 90% alcohol.

QuinineHydrochloride 2 with Antipyrin 1 will dissolve in 4 of water

Uses and References—

Emulsion, 1 in 60 with cod liver oil, for dressing burns, chronic ulcers and intertrigo.—L. i./02,443.

It is sometimes better tolerated than the Sulphate.

In malaria various Quinine preparations discussed. Some stated to have produced black-water fever. Subcutaneous or intravenous injection useful where not tolerated by the mouth. **Giemsa's Injection** advocated. Quinine Hydrochloride 10 Gm., Water 18 Cc. Ethyl-Urethane 5 Gm., Volume of Product 30 Cc., so that 0·5 Gm. is contained in 1·5 Cc. of solution for injection.—B.M.J.E. ii./09,20.

Imperial Malaria Conference. Quinine Hydrochloride distribution in India. Recommendation that the treatment packet for a week should contain 80 grains made up into 20 uncoated Tablets of 4 grains each,—4 to be taken daily for the first 3 days and 2 for the remaining 4 days.—Major Wilkinson, P.J. ii./12,804.

As a fever prophylactic quinine hydrochloride 3 grains with phenacetin 5 grains is largely used in Portugal.—Ph. Notes.

For the paroxysmal headache or neuralgia so common after malaria the following mixture is recommended :—Quinine Hydrochloride 3 grains, Tincture of Cimicifuga 5 minims, Citrate of Caffeine 2 grains, Spirit of Chloroform 10 minims, Compound Infusion of Orange to 1 ounce, twice daily. *Vide* also Quinine Acid Hydrochloride.

In acute tonsillitis, Quinine internally and as mouth-wash useful; also with Dilute Nitric Acid in cachectic cases of vesicular stomatitis. —Yeo.

Immediately after operation Quinine Hydrochloride 10 grains in 2 ounces of water at 100° F. per rectum followed (about ½ hour afterwards) by saline proctoclysis—or in septic cases—by Olive Oil 6 ounces. The Quinine is repeated every 6 hours for from 4 to 6 doses. Backache eliminated. Nausea less frequent.—E. Bonnot and A. H. Cleveland, Jl. Am. Med. Assn., August, 7/15; B.M.J.E. ii./15,25.

Wounds treated by Quinine Hydrochloride 1% solution as wet dressing, also 1/10% with 1/10% of Hydrochloric Acid as continuous drip. Active in ridding heavily contaminated wounds of the gas bacillus. Quinine is especially effectual in a menstruum of pus.—K. Taylor, B.M.J. ii./15,923. Subsequently in an article on specificity in Antiseptics (see Specificity of Antiseptics, *Vol. II.*) the experimental data obtained with Quinine on the gas bacillus are supported by good clinical results employing 0·5% in gas bacillus (*B. Aerogenes capsulatus*) cases. It has little activity, on the other hand, upon the staphylococcus though fairly active on the streptococcus.—K. Taylor, L. i./17,294.

Anal fissure treated by Quinine Hydrochloride packing (5 grains) and Quinine suppository. Granulation good.—H. G. Leyton, B.M.J. i./18,314.

Mistura Quininæ cum Ferro.

Dose.—½ ounce thrice daily in water 30 minutes after food.

Quinine Hydrochloride 30 grains, Tincture of Ferric Chloride ½ ounce, Glycerin 1 ounce, Water to 8 ounces.

Bad cases of secondary syphilis do well on this.—B.M.J. ii./09,120.

Lotio Quiniæ Hydrochloridi R.O.H. 1%. For corneal ulcers *c.f.* p.673

Pessus Quininæ.—3 to 5 grains of Quinine Hydrochloride. A valuable remedy for leucorrhœa.

Tablets, 1, 2, 3, 4, and 5 grains.

Vaginal Suppositories (flat shape) containing 5 grains Quinine Hydrochloride have been prepared *without glycerin*, using a basis of Gelatin 1, Water 9. They should prove less irritating.

For further information c.f, Quinine Acid Hydrochloride (*infra*) *and Quinine Sulphate, etc.*

Tinctura Quininæ (*Off.*). *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Quinine Hydrochloride 1, Tincture of Fresh Orange 50. A very agreeable form of taking small doses of Quinine. Hydrochloride of Quinine is used in place of Sulphate, as first suggested by W. Whitfield, P.J., Vol. VIII., 440, and again by the late W. Martindale. —P.J. Vol. IX., 407.

Vinum Quininæ (*Off.*). *Dose.*—½ to 1 ounce (**15 to 30 Cc.**).

Contains one grain of Quinine Hydrochloride dissolved in one ounce of Orange Wine.

The Board of Customs and Excise allow the sale of Quinine Wine without Excise licence on the following conditions:—

(*a*) *It is prepared in accordance with the Off. directions.*

(*b*) *That sales are made only by duly qualified chemists and druggists*; *and*

(*c*) *It is labelled to show that it is to be used as a medicine.*

The word "*Dose*" *should appear on the label in bold type.*

This should not exceed the Off. dose—viz., ½ *to* 1 *oz.—but the Board do not object to the use instead of the words* "*one or two tablespoonsful.*" *or* "*half a wineglassful.*"—C.D. i./13,305.

To estimate approximately add dilute Sulphuric Acid ½ drachm to Quinine Wine ½ ounce, then Mayer's Reagent (*q.v. Vol. II.*) 2 drachms or *q.s.* Collect, wash and dry the precipitate, which should weigh 1½ grains.—P.J. ii./05,901.

Quininæ Hydrochloridum Acidum. In Fr. Cx. is termed 'Neutral' Quinine Hydrochloride. $C_{20}H_{24}N_2O_2.2HCl=397{\cdot}248$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**), *Antimalarial dose* (*U.S.*) *at least* 15 *grains daily.* ½ to 2 grains (**0·03 to 0·12 Gm.**) hypodermically.

In white or yellowish white crystalline crusts. *Off.* states in amorphous powder. Is claimed to be soluble 1 in 1 of water. Contains 81·6% of quinine. It is the best salt for making injections which have to be sterilised (*c.f.* Bi-Sulphate). 1 grain in 6 minims is suitable for hypodermic use. *e.g.*, in malaria, also internally, as prophylactic against.—The hydrochloric radical is not as irritating as the sulphuric to the stomach.

N.B.—Fr. Cx. adopts the salt + 2½ H_2O. Crystallised from alcohol more or less charged with water. The Salt contains alcohol and water of crystallisation. Left exposed to the air this loses its alcohol and the Salt changes into one with 2½ molecules of water, becoming at the same time opaque.

Liver Abscess.—After exploratory aspiration repeated irrigation of an abscess cavity with Quinine Bihydrochloride 3 to 5 grains per ounce may render subsequent operation unnecessary.—B.M.J.

ii./08,1248,1251; see also Sir C. P. Lukis, B.M.J. i./13,1358. *c.f.*, also Emetine for further abstracts of this paper.

MALARIA.—In malaria give it when the sweating stage begins. *Dose* should never be less than 5 grains, or more than 30 grains per diem,—best given in three 2-hourly doses of 10 grains in the morning. If given intramuscularly 8 grains should be given each night.—Sandwith, B.M.J. ii./09,1801.

Malarial Relapses.—An Investigation of Treatment under direction of Sir Ronald Ross.

The best treatment for old cases of malaria was a system carried out by M. Harrison. It was used on 49 chronic cases mostly of benign tertian. The percentage of relapses was only 10·2. By this treatment fever was reduced within 12 to 24 hours, and no asexual parasites could be found after 48 hours.

Patient to remain in bed 12 days (this period may be reduced) and to receive intramuscularly in each deltoid muscle 15 grains of bi-hydrochloride daily with 10 grains of Quinine Hydrochloride in Mixture No. 1 (*infra*) thrice daily, totalling 60 grains of Quinine daily for the 12 days. Patient is then allowed up and receives for three days Mixture No. 2 four times a day (60 grains of Quinine daily by the mouth). Patient is then put on Mixture No. 3 four times daily for 14 days (20 grains of Quinine daily). Light work allowed all the time.

For a dose after food:—

Anticachexia Mixture No. 1.

Quinine Hydrochloride 10 grains, Tincture of Ferric Chloride 5 minims, Solution of Strychnine Hydrochloride 5 minims, Hydrochloric Solution of Arsenic 5 minims, Dilute Nitro-Hydrochloric Acid 5 minims, Magnesium Sulphate ½ drachm, Syrup of Tolu ½ drachm, Glycerin 10 minims, Water to 1 ounce.

Anticachexia Mixture No. 2.

As No. 1, but *add* Quinine Hydrochloride 5 grains and Dilute Nitro-Hydrochloric Acid 5 minims to the dose.

Anticachexia Mixture No. 3.

As No. 1, but *reduce* the Quinine Hydrochloride 5 grains and Dilute Nitro-Hydrochloric Acid 5 minims in each dose.—B.M.J. i./18,428.

Intravenously Newton Pitt uses 4 grains in water 10 Cc. This salt and the acid Hydrobromide are the most suitable. 10 to 15 grain doses of both these can be given to adults, although half the amount of the acid hydrochloride commonly produces cinchonism.—L. Rogers, B.M.J. ii./17,381.

ABSORPTION AND EXCRETION OF QUININE.—(See also expts. by M. Nierenstein, B.M.J. i./18,428).

"Most of the Quinine admitted by the mouth is, under ordinary circumstances, absorbed from the small intestine; a slight amount from the stomach, especially if administered while fasting and in the form of an easily soluble salt in water; a relatively smaller amount by the large intestine. Affections of the gastro-intestinal tract and liver influence the amount absorbed, as also do the food contents and degree of solubility of the salt given. Absorption is retarded if Quinine is given with, or soon after, food, also when the less soluble salts are employed. Rapid and energetic absorption is best obtained by giving a soluble salt during fasting; gradual and prolonged absorption by administering a less soluble salt with, or soon after, meals; under such conditions absorption is maintained at a considerable level for about eight hours Thus, when sporulation is regular, a soluble salt should be given during fasting, two or three hours before the paroxsym; in other cases one of the less soluble salts should be given with, or soon after, meals, every eight hours. Captain MacGilchrist also regards *Quinine Salts as fundamentally unsuited for hypodermic use*, and therefore considers this method should be entirely *abandoned*. In intravenous injections great dilution, 1 in at least 150, is necessary to avoid the dangers special to Quinine. *Seven grains of Quinine Bi-hydrochloride should be dissolved in from two to three pints of saline solution.* This method is called for in cases of emergency. When there is a tendency to hæmoglobinuria, the Quinine Alkaloid, instead of one of its salts, should be used. Rectal injections, Captain MacGilchrist considers irritating, and of little value, and suppositories of Quinine are useless in malaria."—L. i./11,1221.

See also Quinine Sulphate, p. 673, *Acid Sulphate* 678 *and Quinoidine* 680.

Tetanus and Quinine Injections. Cases of tetanus have supervened on hypodermic injections of Quinine. There is tissue destruction at the site of injection. When Quinine is given hypodermically to tetanus-infected animals, tetanus germs are transferred from the original site of injection to the site of Quinine injection. Tetanus Antitoxin is an efficient prophylactic against tetanus when it is necessary to give Quinine hypodermically.—L.i./11,1368. 1589.

Quinine as local anæsthetic.—When a solution of a Quinine Salt of ½ to 1% strength (for mucous membrane a 10% solution may be applied with cotton wool) is injected into the tissue a coagulable exudation forms, beginning a few minutes after the injection and becoming complete after 24 to 48 hours. The exudation is absorbed after a week or two. If the skin is injected and at once incised much of the Quinine Solution escapes into the wound and very little exudation occurs, and the anæsthesia is short, though even then it may last a few hours. In these circumstances the wound heals as if no local anæsthesia had been used; therefore this is the method to be adopted when a short anæsthesia will suffice, and prompt healing of the wound is desired. When, however, primary union is not possible, and a more prolonged anæsthesia is wished for, it is important that the tissues should not be incised at once; in fact, not until the infiltration has formed after half an hour or more, for when this infiltration has occurred, the anæsthesia may last several days.—L. ii./10,840.

Soluté de Quinine pour injection hypodermique.—Fr. Cx.
Quinine Acid Hydrochloride 3 Gm., Antipyrin 2 Gm., Water to 10 Cc. Special instructions as to sterilisation are provided, *q.v.*

Isotonic Quinine Acid Hydrochloride Solution contains 0·565 Gm. in 10 Cc.—P.J. i./12,357.

Sterules, Hypodermic, contain 2 grains (**0·12 Gm.**) also 3 grains (**0·2 Gm.**), 5 grains (**0·3 Gm.**) also 15 grains (Gm) in 2 Cc. for ***Malarial Relapses.***

Also **Sterules, Hypodermic of Quinine Acid Hydrochloride** 5 grains (**0·3 Gm.**) with **Antipyrin** 3 grains (**0·2 Gm.**).

Tablets 1, and 5 grains. **Tablets, Hypodermic,** 1, 2, and 3 grains.

Quininæ Hydrochloro-Carbamidum.—*Syn.* Urea-Quinine.

(A variety ✱**Nikalgin** (T.M. 366289.)—B.M.J. i./18,254.).

$C_{20}H_{24}N_2.O_2.HCl\ CO\ (NH_2)_2,HCl+5H_2O=547{\cdot}385.$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In small prisms, soluble 1 in about 1 of water. Contains 59·2% Quinine. Used hypodermically in malaria 2 to 5 grains and in cholera, in as large as 12 to 15-grain doses.

As *local anæsthetic* analgesia persists for 4 to 6 hours, even to several days. Used in America for malaria in which marked anæsthesia was noticed at the site of injection, hence its trial as a Cocaine substitute. 3 to 5 Cc. hypodermically of 1% solution (up to 3% is harmless). In 10 to 30 minutes produces anæsthesia; at the same time it acts as a hæmostatic. Healing of wounds is, however, delayed owing to thickening of the edges due to fibrinous exudation.—Pres. 1910, p. 19, 170; L. i./11,1581. In operations on hæmorrhoids 2% solution has caused sloughing.—S. T. Earle, Interstate Med. Jl., Feb., 1913, per Pres.

J. E. D. Jones writes us 5 Cc. of 1% solution injected to ease pain in a case of spinal injury. Anæsthesia was prompt and profound and lasted 2 days without ill effect afterwards—far superior to Cocaine and Morphine.—A godsend.—Dec. 24th, 1912.

In tonsillitis and in tuberculosis of the larynx 10% solution or less is suitable,—even 20 or 50% may be used. Apply by spray, sponge, brush, etc. A teaspoonful or so of solution may be taken in the mouth and used to bathe the tonsils by swaying the head from side to side.

Sterules contain 3 and 5 Cc. of 1% solution for subcutaneous use.

Sterules of Urea-Quinine with Eucaine $\frac{1}{4}$ grain each for dental use are prepared.

Suppositories contain 5 grains for use in painful hæmorrhoids.

Ointment (with Lanolin and Soft Paraffin basis) 20%.

Quininæ Hydriodidum. *Syn.* QUININE IODIDE. $C_{20}H_{24}N_2O_2,HI = 452{\cdot}24$. Is in minute pale-primrose coloured, slightly soluble crystals. **Quininæ Hydriodidum Acidum.** *Syn.* QUININÆ IODIDUM ACIDUM. $C_{20}H_{24}N_2O_22HI,5H_2O = 670{\cdot}248$. Is in golden crystals, soluble about 1 in 20 of water. Contains 48·4% Quinine. Must be kept from the light. **Quininæ Hypophosphis.** $C_{20}H_{24}N_2O_2,H_3PO_2 = 390{\cdot}376$. In crystals or powder Slightly soluble in water, more soluble in alcohol 90%. Contains 83·1% quinine.

Quininæ Lactas, Quinine Lactate.

$C_{20}H_{24}N_2O_2.CH_3.CHOH.COOH = 414{\cdot}375$.

A granular white powder, soluble 1 in 10 of water; said to be well tolerated. Contains 78·3% of quinine. Suitable for hypodermic injection. For gonorrhœa, 1% solution forms an excellent injection.

Dose of each of the above.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more.

Quininæ Nucleinas. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

Yellowish powder containing 60% quinine and 40% nucleinic acid. Insoluble in water. In syphilis has been employed as 5% suspension in Olive Oil. Intramuscular injections of 10 Cc. were used, assisted by intravenous injections of the hydrochloride.

See also Quinine Hydrochloride, and compare Quinine Urethane

Quininæ Phosphas.

$2[C_{20}H_{24}N_2O_2], H_3PO_4 + 8H_2O = 890{\cdot}816$.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**). Is in acicular crystals like the sulphate, but harder and denser. Contains 72·8% quinine Composition varies with manufacturers. Soluble 1 in 420 of water.

Quininæ Quinas.—$C_{20}H_{24}N_2O_2.C_7H_{12}O_6 + 2H_2O = 552{\cdot}475$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

A combination of Quinine with an acid already existing in the bark; possible advantages.—P.J. i./13,401. *Solubility* we find 1 in 7. Suitable for injection.

Quininæ Salicylas.

$C_{20}H_{24}N_2O_2.C_6H_4(OH)COOH + H_2O$ (U.S.) = 480.411.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

White crystals, sparingly soluble in water, and about 1 in 60 of alcohol 90%.

Incompatible with mineral acids—salicylic acid may crystal·

lise out. Contains 68·8% of quinine. Should be given suspended in water, or in cachets, or pills with syrup of glucose ; recommended for diarrhœa and neuralgia, rheumatism and sciatica.

In rheumatic fever virtually inert; cases treated with 10 to 15 grains six hourly.—R. Stockman, B.M.J. i./13,599.

Effervescent Quinine Salicylate.

Dose.—1 drachm. Contains 3 grains in 1 drachm.

Used in the tropics as a prophylactic to malaria.

Tablets 3 grains (**0·2 Gm.**). *Dose.*—1 to 2.

Capsules contain 5 grains (**0·3 Gm.**).

In dengue Quinine Salicylate 5 grains every four hours has proved useful.—Brooke.

Quininæ Acetyl-Salicylas.

$C_{20}H_{24}N_2O_2.CH_3.COOC_6H_4COOH = 504{\cdot}421$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Useful antipyretic and antiseptic compound. Contains 64·3% Quinine. Melting at 167° C. ***Soluble*** in Water 33, Alcohol 1 in 40, Chloroform 1 in 10. Immediately decomposed by Acids and Alkalis. Tablets, 3 grains are prepared.

Quininæ Sulphas, Quinine Sulphate (Termed '**Basic**' **Quinine Sulphate** in Fr. Cx. and **F.E.**).

$(C_{20}H_{24}N_2O_2)_2.H_2SO_4 + 7H_2O = 872{\cdot}812$. Fr. Cx. and P. Jap give $8H_2O$. *Off.* $7\frac{1}{2}H_2O$.

This is the principal quinine salt, it contains 73·5% (*Off.* formula).

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**), tonic ; 5 to 15 grains (**0·3 to 1 Gm.**), antiperiodic.

White bitter crystals. ***Soluble*** 1 in 800 of cold water, 1 in about 100 of 90% alcohol, 1 in 40 of glycerin. It is rendered more soluble by the addition of Antipyrin.

Over Dose.—100 grains of Quinine Sulphate taken in one dose in error. Hot infusion of coffee gave great relief and holding hands in *hot* water. Temporary deafness was caused.—E. T. Jones, L. i./14,277.

Quinine Blindness caused by 20 Gm. Stomach lavage, enemata, etc. Central vision reappeared after 15 days, but peripheral vision and vision for colours returned more slowly.—Pres., Jan., 1913,203.

Testing of.—The French Codex method of testing Quinine Sulphate is better than that given by other pharmacopœias.

It is prescribed in pill, cachet, tablet or mixture—if in mixture 1 minim of Dilute Sulphuric Acid to the grain of salt will render more soluble with fluorescence. For pills 1 drop of strong Sulphuric Acid as excipient for 5 grains.

Incompatible with alkalis and alkaline carbonates, also incompatible with Liquor Ammonii Acetatis (unless distinctly acid in reaction), iodides, and astringent infusions containing tannin. The addition of a small proportion of sodium hypophosphite may overcome the incompatibility with potassium iodide—*i.e.*, the formation of herapathite (quinine iodosulphate).—To prevent coagulation of the precipitate when prescribed with alkalis, mucilage of acacia should be ordered. With Phenol in a pill may liquefy.

The heating of Aqueous Solutions of Quinine and Cinchonine Salts to boiling point (98 to 102° C.) is stated to convert the alkaloids into toxic isomers. Long exposure to sunlight is said to do the same.—C.D. ii./12,475.

Flavoring—Glyl Vanillæ, Glyl Menthæ Piperitæ (bold doses); Syrupus Aurantii.

Uses.—For all forms of fevers, and as prophylactic; wards off remittent fever. For neuralgia and nervous headache; it combats whooping cough, influenza (Ammoniated Tincture) and hay fever. It increases uterine action, and is the most used tonic drug; antiseptic in typhoid, phthisis and pneumonia. Pills of Quinine, Atropine, and Arsenic (*q.v.*) will frequently stop the development of a "cold." If Quinine deafness occurs, or for large doses, hydrobromic acid should be used. In labyrinthine disorders, it is very uncertain—often intensifying the symptoms. May be administered by Iontophoresis.

Quinine affects metabolism. The total solids excreted by the urine may drop 40% within 24 hours after a single dose.

Capsules contain 1, 2, 3, and 5 grains.

Diphtheritic ophthalmia and all cases of infective and sloughing ulcers of the cornea. Quinine Hydrochloride or Sulphate locally applied is useful.—Sir John Tweedy, B.M.J. i./16,11. 1% solution of sulphate with dilute sulphuric acid *q.s.* employed.—L. i./05,360.

MALARIA treated by 4 doses of 7½ grains at intervals of ½ hour in the evening of every third day during the first fortnight of the fever; or for the pyrexia of malaria large doses—15 to 20 grains, with 15 to 20 minims of Laudanum—B.M.J. ii./04,1451.

Klein discovered that quinine is excreted (and therefore presumably absorbed) more slowly when given hypodermically than when given *per os*. In malaria it is a good plan to give both *per os* and hypodermically simultaneously, so that if rejected by the stomach there will be no loss of time. Children bear quinine well. A child of ten will tolerate an adult dose, a child of five will take 5 grains twice daily, and a child of one year will take 3 grains twice daily without risk. Quinine should be kept up in full doses for about a fortnight after the fever has ceased, and then continued in doses of 10 grains twice daily on two consecutive days in each week. If the drug is stopped, even after two or three weeks of thorough treatment, relapses are the rule, and it is generally only after the occurrence of the relapse that the average hospital patient begins to take seriously the advice to continue the use of the quinine.—I.M.G., Jan., 1907, p. 10 (*et seq.*).

In taking Quinine as prophylactic to bear in mind that it destroys the parasite more surely at moment of sporulation—as a rule, *i.e.*, once in 48 hours; take 10 to 15 grains once every 8 days instead of small quantities daily.—B.M.J. ii./05,1289. Give it a few hours before the paroxysm.—Pr. Feb., '09,246. The general opinion is that it acts directly by killing the parasite.—Hewlett, L. i./09,744. It has little effect on the young endocorpuscular forms of the parasite.

Results of Experience in the War in Malaria.

Every case of malaria (treatment advised for United Kingdom) must receive 60 grains of quinine every week until the patient has been free from malaria fever for at least 60 days.—R.A.M.C. Journal, Sept. 17, B.M.J. ii./17,699.

Always give Calomel first. Never give Quinine in solid form, but always in solution with a little Sulphuric Acid. Wait until a high temperature has subsided before giving. Never give it on an empty stomach, and in many cases give a little alcohol after.—E. Yeates, B.M.J. ii./17,878; i./18,603.

Intramuscular injections of big doses of Quinine dangerous.—C. A. Johnston, B.M.J. i./18,586.

In India after proving a case to be malaria by examining a smear as much as 30 grains is given in a bad case. This causes bad headache, but clears up the attack in a short time, barring a relapse. The soldiers themselves, having been given a five grain pill, provide themselves (when they can manage it) with *five more pills*, and take the six together !—R. E. P.

Malaria in the Salonica Army. Quinine *per os* found preferable to intravenous use—give a salt which dissolves slowly, *e.g.* the sulphate. Investigation by estimating with Tanret's Reagent the amount of quinine excreted shows that the intravenous method produces the shortest stay of quinine in the system. Intramuscularly in oil gives the *longest* retention. Arrhenal 0·2 to 0·3 Gm. to be injected on two successive days, alternating with two days of treatment with 2 Gm. of Quinine.—L. ii./17,358.

Subtertian Cerebral Malaria treated with Quinine and Galyl—the quinine *per os* (20 grains thrice daily) and intravenously (0·8 Gm.) over a period of time and the galyl (0·2 Gm. to 0·4 Gm.) subsequently intravenously.—A. W. Falconer and A. G. Anderson, L. ii./17,486.

Relapses.

In the majority of relapsing cases, Quinine *per os* is adequate—20 grains either daily or twice weekly during stay in hospital. Where this is inadequate combined oral and intramuscular administration (60 grains daily for 4 days).—E. B. Gunson and co-workers, L. i./18,866.

The results of systematic investigation in "anti-relapse quinine prophylaxis" indicate that short intensive treatment, *e.g.* up to 180 grains of sulphate or hydrochloride in 3 days, effects cure in a substantial proportion of cases.—L. i./18,301.

Never seen a patient relapse a second time while taking 20 grains a day. In spite of general opinion, quinine may well be commenced *per os* as soon as malaria parasites have been found. To wait until temperature comes down is wasting time—in some it never comes down until patient dies. Intravenous and intramuscular injections should be reserved for persistent vomiting or coma.—W. Fletcher, L. ii./18,432.

Relapses can be cut short by Quinine Sulphate in solution 10 grains three times a day for a week. After the week give ten grains regularly once a day.—Sir Ronald Ross, per T. H. Jamieson, B.M.J. i./19,739. *See also our page* 669.

Prophylactic Use.

On the first day of the month give a dose of Calomel and after the bowels are well cleared, 15 grains of Sulphate in dilute acid after a good meal. Repeat this on the 15th of the month. Pay attention to bowels at all times.—E. Yeates, B.M.J. i./18,603.

Enquiry in Forces in Macedonia. It is a bare investment for immigrants in the absence of protection against mosquito bites. Quinine may be little more than a pious fraud merely guided by public opinion. The problem wants working out scientifically on experimental lines.—C. H. Treadgold, B.M.J. i./18,525.

The only practical prophylactic for armies in the field, 1/20 grain Arsenious Acid daily. Quinine is curative *only*.—C. A. Johnston, B.M.J. i./18,586.

Thorough treatment ranging from 5 to 10 grains on two successive days per week up to 20 grains daily, failed to prevent incidence of malaria in Salonica in 1916—17. It was estimated that at least 80 to 90% of units were infected. The prophylactic quinine was dropped in 1918 as no dose that could be tolerated had any protective value to troops exposed under campaigning conditions.—G. T. Rawnsley, B.M.J. i./19,501.

Query as to whether Quinine Sulphate is any use as a prophylactic against malaria. When tablets were used they more often than not are passed in the motion undissolved. Quinine Hydrochloride Tablets were not issued.—W. H. Sutcliffe, B.M.J. i./19,726.

Malaria in England.

Fatal cases of æstivo-autumnal malarial fever in England.—A. J. Hall, E. H. Wlliams and J. S. C. Douglas, L. i./18,734.

Treatment in England. Discussion of Quinine Dosage.—B.M.J. ii./19,744; see also W. H. Willcox, *ibid.* 796, and L. ii./19,1105; Sir R. Ross, 863; T. H. Jamieson, L. ii. /19,266; S. P. James, *ibid.* 1016.

Antimalarial measures in England. Dangerous areas and Quinine prophylaxis.—A. Macdonald, B.M.J. i./19,669.

Anopheline Mosquitos in Great Britain. Three species of Anopheles indigenous in Great Britain. Of these, two—*A. Maculipennis* and *A. Bifurcatus*—are known to be malaria carriers but in view of relative infrequency and many other factors, can hardly be viewed as a source of danger in spreading malaria. Of the millions of Anopheline mosquitos bred in a locality only a few would be likely to bite a human being at all, fewer would be likely to bite an infected human being, fewer still would bite an infected person whose blood contained sexual parasites suitable for transmission into a mosquito.—B.M.J. ii./18,63. See also L.ii/18,151.

Risk of spread of malaria in England. Occurrence of Anopheline mosquitos.—B.M.A. Discussion, B.M.J. i./19,490.

For further notes on Malaria treatment see Quinine Acid Hydrochloride.

In Blackwater fever give 15 grains on two successive days, at 10 days' interval.—B.M.J.E. ii./04,83.

Dysentery best treated by quinine and sulphuric acid.—B.M.J. i./06,1326.

In puerperal sepsis 2 to 5 grains every 4 hours, or 10 grains twice daily in form of suppository acts favourably on the nervous and general system.—B.M.J. ii./09,1038.

Prolapsus uteri treated by local injections of 40 to 80 minim doses of 1 to 5 Solution of Quinine Sulphate prepared by dissolving Quinine Sulphate 12 grains in 30 minims of dilute Sulphuric Acid, and 30 minims of distilled water.

The object is to produce effusion of lymph, which will then form new connective tissue and thus strengthen the ligaments, the uterus being mainly held up by the connective tissues running from the side of the pelvis with the vessels to the side of the uterus. For details of procedure in the operation consult Inglis Parson, Pr., March, '09,358.

Pneumonia.—Quinine given in the earliest possible moment very closely approaches a specific. Continuous treatment with small doses every two or three hours. Quinine is inimical to the progress of most acute infections. In the case of pneumonia it acts remarkably in limiting the spread of consolidation and in altering for the better the entire aspect of the disease. Calomel must be given at the outset to cleanse the whole alimentary tract. Sodium Sulphate may be combined with the Quinine. Vaccine Therapy has proved of little avail.—W. J. J. Arnold, B.M.J. ii./13,102.

R. W. Allen considers Quinine a useless drug theoretically for treatment of a common cold. It is only antiseptic in strength of at least 1 in 500 solution, and a few grains daily internally are not likely to reach the nasal mucus to disinfect it.—L. ii./08,1659.

In exophthalmic goitre.—For two weeks quinine in large doses (1·5 to 2 gm. daily), the drug being pushed to the utmost limit short of producing tinnitus. Then one week with Sodium salicylate, 2 to 4 Gm. daily, then two weeks under calcium chloride, 3 to 4 grammes daily, an interval of eight days being allowed after each medicament. Salt-free diet should be enjoined, sodium chloride being found to hinder, at least partially, the curative action of calcium chloride. —Jour. de Med. de Paris, Dec. 17, 1910, *per* Pres.

Bedsores treated by an ointment of Quinine alkaloid 4 grains, Oleic acid 12 grains, dissolved on a water bath and mixed with Resin Ointment 1 ounce said to be useful.—Pres., Nov., 1911, p. 281.

Acute lupus erythematosus well treated by 10 grains of quinine three times daily.—P. R. S. M. Dermat, Sect., 1911, 51.

Puerperal septicæmia well treated by internal use of 2 grains every four hours; also used with advantage in perityphlitic abscess, gall bladder abscess and empyema immediately after operation and prior to and after operations in bone and joint disease.—V. J. Glover, L. i./17,352.

To induce sleep. Quinine—1 to 2 grains at bedtime stated to have excellent effect (from the '*Hospital*').—P.J. ii./13,526.

Tetanus and Quinine Injections, see p. 670.

Collunarium Quininæ, Quinine Nasal Douche.

Quinine Sulphate 1, Water 1000.

Used in hay-fever. If a stronger solution be required the Acid Sulphate or Hydrochloride of Quinine should be used: excess of acid should be avoided.

Mistura Chlori cum Quinina (Burney Yeo).

To Potassium Chlorate, in powder, 30 grains, in a 12-ounce bottle, add Hydrochloric Acid 60 minims; cork and shake well to liberate chlorine; absorb this by gradually adding, and shaking after each addition, Distilled Water *q.s.* to 11 ounces; add Quinine Sulphate 24 grains (or 36 grains if ordered), Syrup of Orange 1 ounce. *Dose.*—1 ounce (**30 Cc.**) every 2, 3, or 4 hours for typhoid; it quickly cleanses the tongue.

Pills and Tablets of 1, 2, 3, 4, and 5 grains are prepared.

Perles of Quinine Sulphate contain 1½ grains (**0·1 Gm.**) in each.

Ⓟ**Pilula Quininæ Hydrargyri et Opii.**

Quinine Sulphate 1½ grains, Grey Powder 1 grain, Opium ⅙ grain, Quassia Extract *q.s.* thrice daily after food.—B M.J. i./09,1464.

In syphilis Quinine is useful before or after a course of Mercurial treatment. Acts beneficially in any septicæmic state with fever, whether due to gonorrhœa, syphilis, or enteric. Quinine, Opium and Mercury are sheet anchors in treatment of early syphilis.—B.M.J. ii./09,78,504.

Ⓟ**Pilula Quininæ Ipecacuanhæ et Camphoræ.**

Dose.—One night and morning.

Quinine 2 grains, Ipecacuanha ¼ grain, Camphor ¼ grain, Liquid Carbolic Acid ¼ minim, have been advocated as preventive of plague. Nim fumigation (burning Azadirachta) also suggested.—L. i./09,637.

P 1 Pulvis Quininæ Compositus. *Dose.*—One powder.

Quinine Sulphate 5 grains, Phenacetin 5 grains, Arsenious Acid $\frac{1}{50}$ grain, Nux Vomica Extract ¼ grain, Milk Sugar (*q.s.*) to 12 grains. One powder (or cachet) every four hours till the fever breaks. This is used as a fever remedy in Demerara and is excellent.—Ph. Notes.

P 1 Pulvis Quininæ, Arsenii, Hydrargyri et Ipecacuanhæ Compositus.

Dose in Cachets.—One at eleven, another at bedtime.

Quinine Hydrochloride 5 to 7 grains, Arsenious Acid 1/36 to 1/24 grain, Compound Ipecacuanha Powder 3 to 4 grains, Calomel 1/10 to 1/6 grain.

Sir J. Cantlie has found this a valuable treatment in chronic malaria with enlarged spleen. Each ingredient serves a useful purpose—the Mercury for its antiseptic effect, the Arsenic enhances the activity of the Quinine, the Opium, not only from its traditional use in malaria but also from the writer's experience is of value as an addition to the prescription.—Jl. Trop, Med., 1914.

Tinctura Quininæ Ammoniata (*Off.* and B.P. 1898).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Quinine Sulphate 2, Alcohol (60%) 90; mix and add Solution of Ammonia 10. The Quinine precipitates on adding to water; a few grains of Tragacanth will suspend the precipitate; with syrup of orange it is palatable, and bears dilution better; it remains bright if mixed with aerated water. Should be kept in the dark, or it will become discoloured.

Capsules and **Tablets** of the above are prepared, each equivalent to 1 drachm.

Tablets Ammoniated Quinine Compound, each equivalent to Ammoniated Tincture of Quinine $\frac{1}{2}$ drachm, Capsicum $\frac{1}{10}$ grain, Camphor $\frac{1}{10}$ grain, Caffeine Citrate $\frac{1}{4}$ grain, Aloin $\frac{1}{20}$ grain. Serviceable in influenza.

Tablets Quinine Acid Sulphate 1 grain with Camphor $\frac{1}{5}$ grain, also this combination Ⓟ **with Aconite Tincture** 1 minim.

Ⓟ**Tablets, Quinine, Camphor, Morphine, and Atropine**—Camphor $\frac{1}{2}$ grain, Quinine Sulphate $\frac{1}{2}$ grain, Morphine Sulphate $\frac{1}{64}$ grain, Atropine Sulphate $\frac{1}{2000}$ grain.

For common colds, especially where excessive running at eyes and nose.

Ⓟ**Tinctura Antiperiodica.** *Syn.* **Warburg's Tincture.**

Warburg's Tincture was originally introduced by the maker as a proprietary remedy, but he published his formula, and in 1890 was in absolute penury.—C.D. i./13,598.

Socotrine Aloes 240 grains, Rhubarb 80 grains, Angelica Fruit 80 grains, Elecampane Root 40 grains, Saffron 40 grains, Fennel Fruit 40 grains, Prepared Chalk 40 grains, Gentian 20 grains, Zedoary Root (*Curcuma Zerumbet*) 20 grains, Cubebs 20 grains, Myrrh 20 grains, White Agaric, in powder, 20 grains, Opium, in powder, 2½ grains, Black Pepper 4 grains, Cinnamon 8 grains, Ginger 8 grains, Alcohol (60%) 1 pint. Macerate for 7 days, press and strain. Dissolve in the product:—Quinine Sulphate 160 grains, Camphor 20 grains. After 2 days filter, add Alcohol 60% *q.s.* to 1 pint.

As it is apt to purge as above prepared, the aloes may be omitted *if so prescribed.*

Dose.—1 to 4 drachms or more (**4 to 15 Cc.**)

Flavoring.—Glyl Coriandri (quadruple dose), Gly Menthæ Piperitæ (ditto) Extractum Glycyrrhizæ Liquidum.

Originally directed for Indian Fever, ague, &c., half an ounce as a dose repeated in 2 or 3 hours; before giving the first dose the bowels should be freely opened, and no food recently taken. Between the two doses nothing should have been taken but a little brandy or beef-tea, and this only if the state of the patient required it.

The name 'Antiperiodica' suggests abortifacient' to French Customs Officials.—P.J. i./11,763.

Zedoary Root. *Curcuma Zedoaria* (*N.O. Scitaminaceæ*). *Dose.*—10 to 30 grains (**0·6 to 2·0 Gm.**). Little used now. Ginger replaces it. *Tinctura Zedoari* (*Simplex*). *Dose.*—1 to 2 drachms (1 in 8 Alcohol 90%).

Effervescent Quinine Sulphate.—2 grains in drachm. *Dose.*—1 to 2 drachms, given as soon as fever shows itself.

Quininæ Sulphas Acidus, Quininæ Bisulphas, U.S., Ph. Ned., Ph. Jap., P. Hung. Termed '**Neutral**' in Fr. Cx. and F.E.

$C_{20}H_{24}N_2O_2.H_2SO_4+7H_2O=548{\cdot}5$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

Quinine Bisulphate changes into quinicine or quinotoxin—possibly a harmful body. The crystalline salt ($+7H_2O$) decomposes to the extent of 0·25% at

60° C., but the exsiccated shows no decomposition at this temperature. The heating of *strong* solutions is deprecated. The Acid Hydrochloride or the Acid Hydrobromide are better for hypodermic injection.—B. F. Howard and O. Chick, P.J. ii./17,143; C.D. ii./17,612.

Tablets. ½, 1, 2, 3, 4 and 5 grains.

Usually masses of crystals: 59·1% of Quinine. Soluble 1 in 11 of cold water, and is therefore a suitable salt for preparing eye lotions. Three grains to an ounce of water has a specific action on opthhalmic diphtheria. Malaria is treated by injections of 4 grains daily for 5 days. Incompatible with Potassium Iodide.

MALARIA TREATMENT.—Quinine Bisulphate 4 grains in 20 minims of 0·5% Saline solution subcutaneously once daily for five consecutive days in alternate flanks. In addition Arsenious Acid 1/20th grain *per os* and also 5 grains (only) of Quinine well diluted in the early morning—continue for a month.—C. A. Johnston, B.M.J. i./18,586.

Cystitis treated by Quinine Bisulphate 1 in 2.000 as an irrigating solution. Irritation is not noticeable. It will inhibit growth of *B. Typhosus* in the strength of 1 in 30,000.—E. McDonald, Jl. Amer. Med. Assn., Feb. 6/15, 505, per P.J. i./15,287.

Tablets of Quinine Rhubarb Compound, also called **Livingstone Rousers** contain Quinine Acid Sulphate 1 grain, Jalap 1½ grains, Calomel 1 grain and Rhubarb 1½ grains; are given to check malarial poisoning.

In purulent ophthalmia, hypopyon and keratitis *Guttæ* containing 3 grains with 12 grains of boric acid per ounce are useful.

Esanofele.—A proprietary preparation in pill form containing in each Quinine Bisulphate 0·09 Gm., Arsenious Acid 0·0009 Gm., Iron Citrate 0·027 Gm., Extract of Bitter Herbs 0·145 G.m.

Used in malaria.

Dose.—For a child 3 to 6 years: two pills daily preferably in the morning, *e.g.*, one at 6 and another at 9. For 7 to 14 years two at 6 and two at 9. For adult six daily, *e.g.*, two at 5, 8 and 11 a.m. respectively. Fifteen days constitute a course.

Quininæ Tannas, Quinine Tannate, P. Jap. (30% Quinine). **P. Helv.** (30—35%), **P.G.** and **P. Dan.** (30—32%).

P. Austr. and **P. Hung.** give method of making from the sulphate.

$C_{20}H_{24}N_2O_2,3C_{14}H_{10}O_9+8H_2O(?)=1434{\cdot}89$.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**). An amorphous yellowish white powder, obtained by the decomposition of the sulphate with a solution of tannin, contains 22·6% of Quinine (U.S. requires between 30 and 35%) and is slightly soluble in water and about 1 in 3 alcohol 90%. Being almost tasteless is recommended for children, to be given in milk.

It has, however, the disadvantage of splitting up only slowly into its constituents in the intestines, hence lacks in promptitude and certainty.—P. May.

With 1 molecular proportion of Neutral Quinine Sulphate to a little more han 3 of Tannic Acid the precipitation is complete.—Schmidt.

Tabellæ Quininæ Tannatis.

Contain 1 grain in a chocolate basis. Suitable for children. As a prophylactic to malaria. H. recommends these for whooping cough.

Quinine Tannate has also been given as a stimulant in enterocolitis in children, and with ergotin for sweating.

Quininæ Valerianas. 'BASIC' QUININE VALERIANATE, FR. CX.
$C_{20}H_{24}N_2O_2,C_4H_9.COOH = 426{\cdot}417$.
Dose.—1 to 4 grains (**0·6 to 0·25 Gm**).

White crystals, or powder with slight valerianic odour, contains 76% of Quinine, soluble 1 in 80 of cold water.

Pills containing 1 grain each of the Valerianates of Quinine, Iron and Zinc. For nervous headache and hysteria.

For treating paroxysmal sneezing, H. Tilley finds these useful.

ⓅCapsulæ Valerianatum Compositæ. Form I.

Dose.—One thrice daily. Valerianates of Quinine, Iron, and Zinc 1 grain each, Nux Vomica Extract ¼ grain, with or without Cascara Extract 1 grain. Taste and odour covered with Saccharin and Mint. Nervine tonic.

ⓅCapsulæ Valerianæ Compositæ, Form II. *Dose.*—One after meals thrice daily. Valerian Extract 2 grains, Phenol 2 grains, Strychnine Hydrochloride 1/40th grain, Codeine ¼ grain, Rhubarb Extract 1½ grains.

Tonic, antiseptic and nerve sedative for use in dyspepsia.—G. Rankin, B.M.J. i./15,1036.

Quinine Ethylcarbonate. P. Jap., P. Helv. *Syn.* ✱EUQUININE.
$C_2H_5O.CO.OC_{20}H_{23}N_2O = 396{\cdot}359$.

T.M. 205746/1897 (Design). No. 313495/1909 (Euchinin). "Euquinine" was regtd. No. 317242/1910 as an "Associated Mark"—with 313495 and 205746.—C.D., Feb. 27/15.

PATENT 4991 (1896) and 22639 (1899)—now public property. German Patent 91370 (18/12/95) with addition of 123748 (30/1/00). U.S., Patent 585068 (1897). *c.f.* also Aristochin and Chinaphenin.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**) in cachet.

Manufacture.—Prepare Chlorocarbonic Ethyl Ether (B. pt. 94° C.) by passing Carbonyl Chloride into Absolute Alcohol, and allow the rectified product to react with Anhydrous Quinine in Ethereal solution when the Quinine Ethyl Carbonate is obtained on evaporating and washing with Sodium Carbonate solution *q.s.* to remove the acid.
$C_{19}H_{20}N_2.OCH_3.OH + ClCOOC_2H_5 = C_{19}H_{20}N_2.OCH_3.OCOOC_2H_5 + HCl$.
The method is reasonable chemically but the final substance is difficult to crystallise. This we believe is due to the fact that Carbonyl Chloride prepared by the usual laboratory processes is impure.

The patent specification processes are probably misleading. They speak, for example, of adding gradually Quinine 6·5 kilos to "30 kilos of Benzol solution containing 12% of Phosgene gas," etc., or "adding Quinine 5 kilos to a solution of 1·8 kilos of Chloroformic Ethyl Ether in 20 kilos of Benzol."

White needle crystals, M.pt. 93 to 95° C., with little taste, sparingly soluble in water, more so by addition of dilute acid; easily soluble in alcohol. Intended to replace quinine. **Tablets** contain 8 grains.

Whooping Cough has been treated with it.

Other salts of Quinine in occasional demand are the **Hydrochloro-sulphate, Iodate, Lygosinate** and **Sulphocarbolate.**

Aristoquinine *Syn.* **✱Aristochin.**

$CO(C_{20}H_{23}N_2O_2)_2 = C_{41}H_{46}N_4O_5 = 674{\cdot}613$. The carbonic ester of quinine in white tasteless powder containing 96·1% of quinine. *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**) according to age.

Trade Mark 238180/1901 removed from Register in 1915, but No. 322521 remains.

Patents: 16564/1898—now public property. U.S.A. Patent 625075/1899.

Example of process from the patent specification:—

Dissolve 1 kilo. of anhydrous quinine in 4 kilos. of chloroform, and pass 76·4 Gm. of phosgene into the cooled solution. To remove quinine hydrochloride formed in the process and small quantities of unaltered quinine, wash the liquid with 1 per cent. acetic acid in water until the extracts no longer taste bitter. The diquinine carbonic ether is then removed from the chloroform solution by shaking with 1 per cent. sulphuric acid in water.

Finally treat the sulphuric acid solution with alkalies and shake out with ether. Evaporate the ether and recrystallise the residue from alcohol or benzene.

We have tried the above process, and on the whole the method seems probably correct and indicative of the actual process employed. Further experience is necessary to increase the yield of the substance, which in our hands was miserably poor.

A few suggestions may be offered :—

Carbonyl Chloride should be available in cylinders as a commercial article. Failing this, the gas as made by the usual processes (oxidising Chloroform with Potassium Dichromate and Sulphuric Acid or with Fuming Sulphuric Acid alone) should be passed through intervening wash bottles—one containing Chloroform would be useful—to condense the acid fumes which are liable to interfere with the reaction. Water is, of course, inadmissible, as it decomposes Carbonyl Chloride. We should doubt if Benzene is a good solvent for crystallisation. It would be well to try dissolving the final substance in Alcohol and adding water or some other liquid miscible with alcohol in which the Quinine compound is relatively insoluble a little at a time with stirring until the precipitated body just redissolves and a faint opalescence is formed and allow to stand in a cool place. This method we have found useful with numerous alkaloidal substances.

Insoluble in water. Given for malaria, typhoid, influenza, and in small doses for pertussis.—B.M.J.E. ii./04,44.

Incompatible with Acids and Alkalis.

Solubility of Quinine, Cinchonine, Cinchonidine, and Quinidine Salts in Water at 25° C.—a considerable research.—Am. Jl. Ph. April, 1910, p. 175.

Quinoidine.—*Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**) thrice daily.

The name given to a mixture of alkaloids (discovered by Seturner, 1830) in the mother liquor after the crystalline alkaloids have been separated. It occurs generally as a dark treacly compound or as a hard mass.

In the malarial season of 1912 investigations were commenced into the efficacy of the Amorphous Alkaloids of Quinine in the treatment of malaria, and the results obtained went to show that these substances are of greater value than the Sulphate and Hydrochloride of Quinine.

It is supposed that the amorphous nature of the Quinoidine renders it more assimilable and possibly accounts for its greater efficacy.

The Sulphate of Quinine was more effectual than the Hydrochloride, 45 to 60 grains of either salt were sufficient to bring any malarial temperature to normal.

With regard to Quinoidine :—

Benign tertian cases required 9 to 13½ grains of Quinoidine to stop fever; *Malignant tertians* required an average quantity of 10 to 16 and *Quartan cases* an average of 22 to 24 grains.

Laverain Tablets. *Dose.*—Up to 6 or 12 during the day.

Contain Quinoidine 2 grains, Ammonium Picrate ½ grain, and Arsenious Acid $\frac{1}{100}$ grain. The Picrate is employed as an anti-malarial drug in addition to the quinoidine. The Arsenic acts as tonic. The preparation is prompt in reducing malarial fever, and specific for the malarial parasite.

In chronic cases with enlarged spleens, or in malignant tertian infections the Laverain Tablets are preferred. Begin with 12 grains daily. This can generally be increased up to 24 grains daily without intestinal or arsenical symptoms.—Maj. E. E. Waters, I.M.G., March & July, 1913.

A further paper by this contributor has appeared (*Indian Medical Gazette*, September, 1916) substantiating the claims for Quinoidine and dealing with some thousands of cases. One report says "quite as efficient as quinine even when given in smaller doses. 2 tablets of Quincidine 2 grains each night and morning almost always reduced temperature to normal and caused disappearance of parasites from peripheral blood in 72 hours or less in malignant tertian; smaller doses suffice in benign tertian." Further, "for benign tertian and quartan infections 10 grains in divided doses and in malignant cases 20 grains uniformly effective." No gastric disturbance or cinchonism. Very large amounts of Quinoidine have been distributed in India since the appearance of the 1913 paper by Major Waters. Prophylactically has checked malaria and reduced spleen enlargement.

For ordinary acute malaria and out-patient work 12 to 16 grains daily are generally sufficient. A preliminary purge to be given (Calomel and Soda) washed down with Mistura Alba. Out-patients are given 20 tablets, enough for three days' use.

It causes less discomfort than quinine and is cheaper. Good summary of general treatment for home use. Special nursing and care required during the attack and after the attack to prevent relapses. Quinine 20 grains a day in divided doses for a week. 10 grains night and morning after a meal, for the next week 5 grains night and morning, for the third 5 grains after breakfast.—D. G. Marshall, L. ii./18,417.

RESORCINUM (*Off.*).

Syn. **Resorcinol,** $C_6H_4(OH)_2$=110·078. *Dose.*—1 to 5 grains **(0·06 to 0·3 Gm.).**

Metadihydroxybenzene is in white crystalline plates, melts at 230° F. (=110° C.) and is easily volatilised. Preserve from light.

Manufacture.—Benzol-Disulphonic Acid is first made by adding Benzol 2·4 to fuming sulphuric acid 9·0 in a large vessel provided with a condenser and adequate stirrer. Then warm the mixture on a water bath for 4 or 5 hours to complete the reaction. Finally heat in an oil bath to 275° C. for ½ hour to convert the mono-sulphonate first formed into Disulphonate with the condenser sloping to collect unchanged Benzol if any. Pour the liquor after cooling into water 75. Then add Milk of Lime (slaked lime and water) *q.s.* to render alkaline. Warm and filter through linen. Wash the precipitate with hot water thoroughly until the liquor gives no marked precipitate with sodium carbonate. Then treat the filtrate with sodium carbonate and test it for calcium. When all the calcium salt is converted into carbonate filter off the latter and evaporate the filtrate almost to dryness. Now fuse with about 2½ times the quantity of sodium hydrate in an iron vessel for 8 hours at 270° C. with good stirring. A little water may be used at first to assist the reaction. Cool the melt and dissolve in water, using about 8 times the quantity of Sodium Disulphonate operated upon. Acidify the solution with Hydrochloric Acid and boil off the sulphur dioxide. Filter out the tarry matter and extract with ether. Distil off the ether and heat to remove ether and water. (Commercially, amyl alcohol is used—this is distilled off and the Resorcin distilled under reduced pressure.) Recrystallise from Benzol 2 or 3 times. Charcoal is useless for decolorising.

Soluble 1 in 1 of water, 2 in 1 of alcohol, 1 in 20 of olive oil.

Incompatible with spirit of Nitrous Ether, and with caustic alkalis.

Uses.—It possesses useful antiseptic properties. It coagulates albumin, and has a caustic action on the skin, but a 2% solution is not irritating. It is an effective topical remedy in diphtheria, and produces no injurious consequences. A 5% solution may be injected into the bladder without causing any irritation, and is useful in inflammatory affections of this organ, likewise in vesical catarrh after gonorrhœa; 5 to 10% solution is of service also in syphilitic sores and skin diseases; and a 1% solution improves unhealthy wounds, and is useful as an eye lotion in conjunctivitis. Given internally, but with great care, it has a specific action comparable to quinine, but it is apt to produce profuse perspiration, and its antipyretic action is short; it is best administered well diluted with water and flavoured with syrup of orange or glycerin. In whooping cough 10 minims of 2% solution or this strength used as spray is of service, as also in hay fever.

Epithelioma and rodent ulcer have been well treated with ointments and plaster up to 30% strength. It is applied locally to condylomata and mucous patches. Pigment of 10% relieves irritation of tubercle of larynx. For eczema and alopecia, cold cream with 2% of resorcin is useful.

In gastric ulcer 2 to 5 grain doses have antiseptic action.

Bronchitis and broncho-pneumonia: treatment by rendering the nasal fossæ and naso-pharynx antiseptic—ointment into the nostrils of Resorcin 1, Boric Acid 10, Vaseline to 100; also swab the mouth with 1% resorcin lotion.—B.M.J.E. i./08,11

In ichthyosis useful—favours desquamation and removes effete horny layer—used in the form of paste. Resorcin ½ to 1 drachm, Glycerin of Starch ½ ounce, Glycerin ½ ounce. Combine this treatment with use of superfatted soap containing Resorcin 5% and Salicylic Acid.—B.M.J. i./07,362.

Resorcin externally proved fatal. A boy of 16 suffering from extensive lupus treated with a paste containing 25 to 30% Resorcin in Gelanthum. Patient became unconscious, cyanosed and motionless with tongue swollen and fixed between jaws. Camphor, venesection, etc., of no avail. Resorcin dangerous over large surfaces.—B.M.J.E. i./15,33.

Tablets, 3 grains (0·2 Gm.). *Dose.*—1 to 3.

Glycerinum Resorcin, G.H.

Resorcin 4, Distilled Water 4, Glycerin to 15.

In chronic urethritis resisting treatment, a single injection (25% resorcin) in fresh cases often beneficial.—Pr., Apl. '09,547.

Lotio Resorcini. *Syn.* SPIRITUS CAPILLARIS.

Resorcin 1, Ether 1, Castor Oil 1, Eau de Cologne 10, Alcohol (90%) 35. Useful for dandruff and alopecia. *Soap and alkali must be removed before use, or hair may be discoloured.*

Lotio Resorcin et Acidi Salicylici.

Salicylic Acid 30 grains, Resorcin 1 drachm, Spirit of Rosemary 1 ounce, Saponin 1 drachm, Lanolin 1 ounce, Aqua Mellis to 10 ounces. Dissolve the Salicylic Acid and Resorcin in the Spirit of Rosemary, melt the Lanolin, add the Saponin dissolved in a little water, place in a warmed mortar, add the Spirituous Solution just mentioned and the Aqua Mellis in parts to make a cream.—C.Fox.

Lotio Resorcini Composita, St. M.'s H.

Resorcin 10 grains, Methylated Spirit 1 drachm, Water to 1 ounce.

Lotio Capillaris.—A stimulant to the growth of hair. Resorcin 5, Capsicum Tincture 15, Otto of Rose *q.s.* Castor Oil 10, Alcohol 90% to 100.

℗**Lotio Excitans, St. G. H.** for the scalp

Resorcin 1½ drachms, Mercuric Chloride 10 grains, Glacial Acetic Acid ½ drachm, Chloral Hydrate 3 drachms, Cantharides Tincture 1 ounce, Alcohol 60% to 1 pint.

℗**Lotio Resorcini Pilocarpinæ et Cantharidis.**

Resorcin 80 grains, Pilocarpine Hydrochloride 15 grains, Cantharides Tincture 1½ ounces, Tincture of Capsicum 4 drachms, Spirit of

Camphor 6 drachms, Castor oil 10 to 60 minims, Oil of lavender 30 minims, Alcohol 90% to 8 ounces. A useful stimulating lotion in alopecia prematura for use after exfoliative treatment.

Lotio Resorcini et Acidi Borici.

Resorcin 1, Compound Tincture of Lavender 10, Glycerin 10, Saturated Solution of Boric Acid 80, as a mouth wash after operations on the mouth.

Nebula Resorcini.—For a common cold, spray nostrils with 1% solution, to which may be added a 'Solube' Borax and Cocaine Compound.

Gargarisma Resorcin E.L.

Resorcin 15 grains, Glycerin 1 drachm, Water to 1 ounce.

Unguentum Resorcini, R.O.H. Resorcin 2, Soft Paraffin to 100

Unguentum Resorcini Compositum. **Ihle's Paste,** St. J. H. Resorcin, Zinc Oxide, Starch, of each 5% approx. in Soft Paraffin. Has been used stronger for bromide acne.

Resorcin liquefies with Menthol, Camphor or Phenol, and a small amount of any of these may well be prescribed in addition so as to form a uniform ointment.—C.D. ii./16,897.

Pasta Resorcini Fortior (Lassar and St. M.'s H.).

Resorcin 20, Zinc Oxide 20, Starch 20, Liquid Paraffin 40. '**Mitis**' 10, 25, 25, and 40 respectively.

Pasta Resorcini et Zinci Oxidi, K.C.H.

Resorcin 1, Glycerin 1, Zinc Oxide 1, Paraffin Ointment (white) 5.

Baculum Resorcini.—Resorcin 3, Wax 2, Lanolin 5.

Resorcin Monacetate. *Syn.* ✱**Euresol** (T.M. 355476).

Manufacture.—Mix Resorcin 440 and Acetyl Chloride 320 and allow to interact completely in an open dish. Then heat to 100° C. for ½ hour. Cool, wash free from acid with water, and dry over exsiccated Sodium Carbonate.

A honey-like mass. Dissolves 10 to 30% in acetone, for use in acne, seborrhœa and sycosis. **Euresol pro Capillis** is the same perfumed. It is directed to be made into a Hair Lotion by mixing 2 parts with Alcohol 70%, 32 and Water to 48. Removes dandruff and itching.

Thio-resorcin. Yellowish powder slightly soluble in alcohol; as a substitute for Iodoform; 5% Ointment in skin diseases.

RHEI RHIZOMA (RADIX).

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**) repeated.

Single dose.—15 to 30 grains (**1 to 2 Gm.**).

The Rhizome of *Rheum officinale* and other species (and the variety *R. tanguticum*, U.S.) (*Polygonaceæ*) grown in China and Thibet, partially decorticated and dried. *For the Constituents of Rhubarb see Vol. II.*

Flavoring.—Syl Vanillæ, Glyl Pini; Syrupus Zingiberis, Syrupus Aromaticus.

Uses.—Laxative and stomachic; often given with Sodium Bicarbonate especially to children.

Extractum Rhei (Alcoholic) (*Off.*). *Dose.*—2 to 8 grains (0·12 to 0·5 Gm.).

Prepared by extraction with 60% Alcohol.

The U.S. IX. preparation is made by extracting the drug with a mixture of Alcohol 4 and Water 1, drying the extract at not exceeding 70° C., and diluting with Starch and Magnesium Oxide so that 1 = 2 of Rhubarb.

Fluidextractum Rhei, U.S. IX. 1=1, by extraction with Alcohol approximately 75%. *Average dose.*—15 minims.

Pilula Rhei Composita (*Off.* and B.P., 1898).

Dose.—4 to 8 grains (0·25 to 0·5 Gm.).

Contains Rhubarb, Aloes, Myrrh, Hard Soap, and Syrup of Glucose, in proportion differing from B.P. '98. May be kept in specie (*sine* Glucose Syrup) 3 parts = 4 of mass. If the Oil of Peppermint (which is objected to by pill manufacturers) were replaced by Menthol, dissolved in Alcohol *q.s.*, the pill would be improved.

Pulvis Rhei Compositus (*Off*). **Gregory's Powder.** *Dose.*—10 to 60 grains (0·6 to 4 Gm.).

Practically identical with B.P., '98. Ginger increased $\frac{1}{11}$. The Heavy Magnesia produces a less bulky powder (not now *Off.*).

Moisture, Alkalinity, Carbon Dioxide content and amount of Rhubarb and Ginger.—G. D. Elsdon and H. Hawley, P.J. ii./15,100.

Flavoring.—Syl Menthæ Piperitæ, Glyl Lavandulæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Syrupus Rhei (*Off.*). *Dose.*—½ to 2 drachms (2 to 8 Cc.). Now 7% by vol. was '98 1 in 20 by weight flavoured with Coriander.

Syrupus Rhei Aromaticus, U.S.

Average dose.—2½ drachms. Aromatic Tincture of Rhubarb 150, Potassium Carbonate 1, Syrup to 1,000.

Tablets of Rhubarb, Soda and Ginger contain Rhubarb 3 grains, Sodium Bicarbonate 2 grains, Ginger 1 grain.

Tinctura Rhei Composita. (*Off.*).

Dose.—½ to 1 drachm repeated, 2 to 4 drachms single dose. Rhubarb Root 1 in 10, flavoured with Cardamom and Coriander as Carminatives. Now made with 45% Alcohol, was 60%.

Flavoring.—Syl Rosæ, Syl Vanillæ; Syrupus Zingiberis.

Tinctura Rhei Aromatica U.S.

Average dose.—30 minims. Rhubarb 20, Saigon Cinnamon 4, Cloves 4, Nutmeg 2, Glycerin 10, Alcohol 50, Water 40. By macero-percolation.

Tinctura Rhei Aquosa. P. Jap., 1907.—Macerate Rhubarb, coarsely cut 10; Potassium carbonate, 1; Sodium borate, 1; in Boiling Distilled Water, 90, fifteen minutes; add Alcohol, 9; after the lapse of an hour strain with slight pressure; with every 85 of the strained liquid mix Cinnamon Water, 15; miscible with water without producing any turbidity. Prepare freshly when required.

Rhubarb Leaves—Notes on use of, L. i./17,708. Poisoning by *ibid*, 847. A little powdered chalk added to the leaves would render them safe in cooking. The leaves in a case of supposed poisoning were stated to contain approximately equal parts of Potassium Binoxalate and Calcium Oxalate—10 grains of each in a pound of leaves. The Calcium Oxalate would be inactive. It is doubtful whether 3⅓ grains—equivalent approximately to ⅓ lb. of leaves—a liberal helping—was the cause of death. A much larger quantity of Oxalic Acid—60 grains has been taken with recovery.—Harrington Sainsbury.—L. ii./17,25.

Air dried leaves contain over 0·2% oxalates reckoned as Oxalic Acid with Malic Acid 0·3 to 1·7%.—W. Kirkby, P.J. i./17,497; ii./17,11.

* SACCHARIN. (T.M. 392328; see also 332891).

Glusidum (*Off.*). *Syn.*—GLUCUSIMIDE, BENZOYL SULPHONIC IMIDE. BENZOSULPHINIDUM, U.S.

$C_6H_4 : SO_2CO : NH = 183{\cdot}145$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more.

A derivative of toluol in white, intensely sweet, crystalline powder. Its aqueous solution has an acid reaction; it forms crystalline sweet salts with alkaloids and metallic bases. Solutions of alkalis and their carbonates dissolve it, the latter evolving carbonic acid.

Soluble 1 in 400 of water, in alcohol 90% 1 in 38 about (by our experiment. *Off.* now employs this), in ether 1 in 100, incompletely in chloroform, and in glycerin about 1 in 50, slightly in oils and fat, also in acetone.

Use.—Instead of sugar for diabetic and obese patients.

It is not harmful in its effects. Conclusion of investigation.—L. ii./17,483; *see* also B.M.J. i./18,377.

Saccharin (Insoluble) is sold in sweetening powers 300, 450, and 550—the above remarks refer to the "550."

British Saccharin—95% purity is the lowest limit which may be issued.

Analysis of.—H. D. Richmond & C. A. Hill, Jl. Soc. Chem. Ind. 1918, *37* 246T, see abst. Y.B.P. 1919, 155 *et seq.*

Saccharinum Solubile, contains about 90% of Saccharin in combination with soda. In yellowish granular, micro-crystalline masses, easily soluble in water, and therefore convenient for flavouring purposes. 1 in 2,000 or 2 grains to an 8-ounce mixture is sufficient.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more.

Elixir Glusidi, B.P.C.—*Syn.* **Elixir of Saccharin.** *Dose.*—5 to 20 minims. Gluside 5, Sodium Bicarbonate 3, Alcohol 12·5, Distilled Water *q.s.* to 100. 1% added to mixtures for flavouring.

Saccharin Tablets. *Dose.*—1 or 2. Under control of the **Ministry of Food** are either *full strength* containing 0·3 grain of British Saccharin per tablet and weighing 1 grain or 'half strength,' containing 0·15 grain and weighing either ½ grain or 2 grains.

Examination of tablets made with uncontrolled Saccharin showed they were far below the British standard.—H. D. Richmond, S. Royce & C. A. Hill, Analyst, 1918, see abst. Y.B.P. 1919, 159.

Detection of in Beer, Wine, &c. Treat Ether Extractive with Potassium Permanganate and then heat with Sulphuric Acid and Di-resorcin. Add water and filter. Intense violet colour indicates presence.—Wauters, Int Cong., 1909.

SACCHARUM PURIFICATUM.

Syn. SUCROSE. $C_{12}H_{22}O_{11} = 342{\cdot}236$.

Crystals or powder, soluble 2 in 1 of water.

In addition to the Refined Sugar obtained from the juice of the Sugar Cane—*Saccharum officinarum* (*Graminaceæ*)—various grades of granular cane and beet sugar both with and without the addition of "blue" are marketed. For the manufacture of Syrups a sugar without the colouring matter is essential. *Off.* and U.S. allow also beet sugar.

Beet Sugar Industry in N. France. An interesting and exact account of sugar preparation. Multiple effect evaporators are used—3, 4 or 5 in series, the concentration being done under reduced pressure—thus preventing in great measure the formation of invert sugar.—W. A. Poucher, P.J. i./17,467.

For the Estimation of Sugar by means of Polariscope and other Methods see Vol. II.

Cane Sugar in certain forms of heart disease. Glycogen is essential to healthy well-nourished muscle—it provides a source of energy for the needs of the tissue cells, especially for muscular work. Prolonged muscular work, especially in starvation may wipe out the entire store of Glycogen. Glycogen stored in the muscle is converted into glucose by a ferment before being actually used. Cane Sugar therefore affords a means for supplying the muscles with Dextrose. The mammalian heart has been kept beating for 91 hours after death by perfusion with Dextrose Solution. Dilated heart in advanced age, valvular heart disease, post influenzal dilatation, heart strain and heart failure in phthisis well treated.—B.M.J. i./11,615.

Life saving by Sugar.—8 ounces during 24 hours in a case of a woman of 77 with heart disease, where Digitalis and Digitalin had no effect. Continued some weeks in slightly less amount. Strength regained slowly.—Stanley E. Denyer.—L. i./13,1092.

West Indian Cane Sugar gives benefit in certain heart affections not obtained with Beet Sugar.—B.M.J. ii./12,200.

Cardiac failure treated by cane sugar. "Improvement simply miraculous."—B.M.J. ii./11,1401. See also B.M.J. i./12,66.

Sugar used to induce an otherwise slack uterus to produce effective labour pains. Sugar with caraway infusion is used to hasten and increase mammary flow in Egypt, as well as to bring about a speedy involution of the uterus. Suggested in such cases as sub-involution, when the administration of drugs may have some retarding effect on the mammary secretion.—B.M.J. i./12,14

In various morbid conditions, anæmia, adynamic varieties of rheumatism, n neurasthenic manifestations of neurotic persons, Cane Sugar is beneficial —¼ lb. to ½ lb. for an adult to be slowly eaten daily and a lump or two at odd times through the day or night, but not just before a meal.—B.M.J. i./11,753.

Dyspepsia of infants efficaciously treated by the addition of 10% of Saccharose to Homogenised Milk. Powdered sugar applied to old ulcers excites healthy granulation in a few days. Also used as a palliative treatment of cancer of the uterus, it diminishes the odour and discharge, whilst hæmorrhage becomes rare.—M.P.C. i./14,366.

Isotonic Cane Sugar Solution. A solution of Cane Sugar 103 Gm. per litre is isotonic with blood.—P.J. i./12,355.

Syrupus (*Off.* and B.P., 1898).

Sugar 1, Water to 1½ by weight, Sp. Gr. 1·33. U.S. order Sugar 85, Water to measure 100. Weaker strengths of syrup do not keep well. Potassium Carbonate 1 grain in 12 ounces of Syrup has been found to prevent crystallisation.

Invert Sugar is prepared by action of dilute mineral acid on Cane Sugar. Consists of a mixture possibly a loose combination of equal weights of Grape Sugar (Dextrose) and Lævulose. A useful substitute for cane sugar in dyspepsia—more easily borne in gastritis.

Invert Sugar forms in simple syrup on keeping—that made by cold process produces more than hot. In 18 months it may reach 6%.—P J. ii./16 545.

***Nulomoline.** (T.M. 379066 Class 42).

A proprietary Invert Sugar stated to show on analysis Glucose plus Lævulose 81·5% (*i.e.*, Invert Sugar), Water 18·475% and Ash 0·025%. Suggested as a Sugar and Glycerin substitute for use in pharmacy and other trades. It is stated to be made from Cane Sugar without the aid of chemicals. If Hydrochloric Acid is not used, we presume the hydrolysis is effected by superheated steam or by passing CO_2 under pressure into boiling cane sugar. It is hygroscopic and non-fermentable.

It has Sp.Gr 1·4 and can be reduced to the Sp. Gr. of Syrup B.P. by mixing 33 parts with water 7 parts, and to that of Glycerin by mixing 13 with 7 of water. We find it is liable to crystallise out in winter.

An analysis of a proprietary Invert Sugar of this kind which we had conducted in 1917 showed Invert Sugar 41%, Unaltered Sugar 38%, Moisture 21%.

Lævulose.—*Syn.* **Diabetin, Fructose.**

$C_6H_{12}O_6 = 180·096$.

A whitish crystalline lævorotatory powder (also honey consistence), freely soluble in water, reduces Fehling's Solution.

Manufacture.—May be prepared by hydrolysis of cane sugar on the following lines:—Heat cane sugar 300 dissolved in water 1,200 with addition of Hydrochloric Acid 7 at 70° C for two hours or until hydrolysis is complete. Dilute with further addition of water to 3,000. Add slaked lime 200. Stir until reaction complete and add ice 700 or *q.s.* and stir until the lævulosate throws out. (The glucosate remains in solution with adequate cooling.) Filter, press the precipitate and decompose the latter with Oxalic Acid. Filter and evaporate the filtrate to a syrup. The evaporation must be done *in vacuo.* This syrup will crystallise in time.

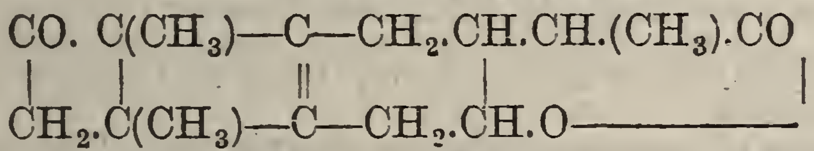
Pure Inulin from dahlia bulbs or chicory root which contain 6 to 12%i also suitable for producing pure Lævulose.

Prepare an 18 to 20% solution of it in ½% Sulphuric Acid and warm this on a boiling water bath for an hour. Neutralise the liquor with calcium carbonate, filter and evaporate the filtrate at a *low* heat to a syrup. Introduce a few crystals of lævulose and stand over sulphuric acid. A crystalline mass of Lævulose will form. Press between porous plates and recrystallise from absolute alcohol employing here also a few crystals of Lævulose as nidus.—Schmidt.

A stronger sweetening agent than cane sugar; has a pleasant flavor. Specially suitable for diabetics.

In impending coma in diabetes the bowel should be washed out and 4% Sodium Bicarbonate with 3% lævulose in a litre of water given by drop enema.—L. ii./13,1395.

SANTONINUM.



$$\begin{array}{l} \text{CO. C(CH}_3\text{)—C—CH}_2\text{.CH.CH.(CH}_3\text{).CO} \\ \;|\quad\;\;|\qquad\quad\|\qquad\quad\;\;| \qquad\qquad\qquad\quad | \\ \text{CH}_2\text{.C(CH}_3\text{)—C—CH}_2\text{.CH.O————} \end{array}$$

or $C_{15}H_{18}O_3 = 246·219$.

Dose.—1 to 3 grains (**0·06 to 0·12 Gm.**) in sugar. U.S. *Average dose.*—1 grain. Fr. Cx.: *Max. single dose*, 1½ grains; max. during 24 hours, 5 grains approximately.

A neutral crystalline principle. The inner anhydride, or lactone of Santonic Acid, obtained from Santonica, the dried flower-heads of *Artemisia maritima var. Stechmanniana* (*Compositæ*).

Syn.—Levant Wormseed, *Flores Cinæ* (*Cynæ*)—P.G., Wurmsamen. Ormesukker (Danish) is a Confection of Santonica.

Soluble 1 in 40 Alcohol 90% and in Oils (1 in 200 of Castor Oil). in Chloroform 1 in 3. Also in Caustic Soda Solution Insoluble in water. Turns yellow in sunlight.

P.G.V. gives a test for the presence of Strychnine in Santonin.

Adulteration with Acetanilide.—A sample contained 80%.—Rep. Pharm., 1912,18.

Uses.—It is an anthelmintic for round (*Lumbrici*) and threadworms (*Ascarides*), but is inoperative against tapeworm (*Tænia*)—R. It colours the urine orange, and in too large a dose may cause objects to appear of a green or yellow colour. A greenish yellow or saffron colour may be produced in the urine, and if the urine be alkaline a purplish red. It relieves the lightning pains of tabes dorsalis. Hare recommends that immediately after taking a dose of Santonin a 2 or 3 grain dose of Calomel is to be given, followed by a saline purge six hours afterwards, the flow of bile being particularly useful in making the worm let go its hold. In urinary incontinence Santonin will often effect a cure. It has been advised for use in diabetes.

As an anthelmintic it is very active in an oily solution, *e.g.*, **Haustus Santonini et Olei Ricini**, Santonin in powder 4 grains, Castor Oil 3 drachms. Mix and emulsify with Mucilage of Acacia 4 drachms, Syrup 1 drachm, Peppermint Water to 1½ ounces. Saccharin ½ grain added is an improvement. Taken fasting in the morning makes a dose for a child of 6 to 12 years, *but caution, vide below.*

New Method of Administration.—A garlic draught should be given at bedtime and in the morning on an empty stomach. Heat a garlic clove, cut small, in a glass of milk 10 minutes, strain and sweeten. Said to render the Parasites more vulnerable. Following on this an Emulsion (*the Santonin being completely dissolved in almond oil*), is then given, 0·01 Gm. for each year of age up to max. dose of 0·3 Gm. The draught is divided into 3 parts at 5 minutes interval, starting a few minutes after the garlic. During the forenoon give lemonade freely, and 2 hours after the Santonin purge with Calomel. This is said to be non-toxic to the patient.—L. ii./09,1189; P.J. ii./09,344.

But *N.B*—***Poisoning has occurred by Santonin given in oily solution.*** Given in powder it is not absorbed and consequently is non-toxic though acting equally well on the parasites.

Santonin poisoning by ½ grain. This dose in two drachms of Castor Oil brought away from a five-year-old girl a large number of thread worms and a few round worms, but the child became weak and looked like dying. After three weeks recovered, but was completely blind and remained so for three months.—L. /10,1693.

In gastric troubles of nervous origin and in epilepsy.—C.D. ii./05,1052.

Pyrexia, diarrhœa discharge of pus in case of a woman in labour, due to round worms which were removed by Santonin.—B.M.J. i./07,200

Pilula Santonini ⅓ grain (**0·02 Gm.**).

Dose.—One thrice daily, *i.e.* with principal meal.

In diabetes Santonin is stated to cause diminution in the amount of sugar eliminated. It appears to act as a sort of digestive (épargne), increasing the power of assimilating Carbohydrates. Course of treatment extends over six weeks, followed by a week or two weeks interval, then continue until disappearance of glucose. A French speciality of this kind contains in addition a tonic balsam and liver stimulant.

Tablets, 1, 2 and 3 grains. *Dose.*—As Santonin.

Confectio Santonini Composita. E.L.

Dose.—1 drachm for a child 2 to 3 years.

Santonin 1, Powdered Ginger 1, Jalap 3, Sulphur 4, Senna Confection 51.

Pulvis Santonini Compositus, GT. ORM. H.

Santonin 2½ grains, Compound Scammony Powder 2 grains, Calomel ½ grain. For a child 1 year old.

Trochisci Santonini. *Off.* 1 grain (**0·06 Gm.**) in each; one every night for a few nights should then be followed by an early morning aperient.

Suppositorium Santonini.

Contains 3 grains (**0·2 Gm.**) or more if ordered. Should be administered every 2nd or 3rd night, for 3 times. Is an efficient anthelmintic, especially for thread worms, which often infest the anus of children, causing them to have disturbed sleep.

Golden Santonin. *Syn.* CHROMO-SANTONIN.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

A modification of ordinary Santonin formed by exposure to sunlight. C. Begg has issued a book on the diagnosis and treatment of sprue. Special stress is laid on the use of **Golden Santonin.** He gives 3 grains morning and evening in oil for 3 days. B.M.J. review holds that the term sprue has been applied to diseases of different pathology as many cases of sprue have not been benefited by the drug.—B.M.J. i./13,561.

It has been used with some success in enteric. We have received private reports of its good effect in diarrhœa of different natures in India.

SAPONES.

Sapo Animalis (*Off.*) or Curd Soap is mainly Sodium Stearate. **Sapo Durus** (*Off.*) (Sapo Medicatus, P.G., etc.) or Castile Soap is mainly Sodium Oleate. **Sapo Mollis** (*Off.*) *Syn.* Sapo Viridis is mainly Potassium Oleate (made with Olive Oil—U.S. Cotton Seed Oil).

Sapo Kalinus, P.G., P. Austr. is made with Linseed Oil. Soluble about 1 in 4 water, and 1 in 1 alcohol 90%.

The theory of Saponification is briefly outlined in Vol. II., in which also details will be found on the approximate composition of Pharmacopœial Soaps, Toilet, Shaving and Household Soaps, the use of Resin and Mottle in Soaps, Transparent Soap, Saponification Nos. of Fats and Oils and other data

Sodii Oleas. *Syn.* EUNATROL.

$CH_3(CH_2)_7CH:CH(CH_2)_7COONa=304{\cdot}354$.

In 2 and 4-grain pills and is given to dissolve gallstones. Useful as cholagogue. **Capsulæ Sodii Oleatis** contain 5 grains.

Capsulæ Sodii Oleatis Compositæ.

Dose.—One night and morning or 2 at night followed by plenty of hot water.

Sodium Oleate 1 grain, Phenolphthalein ⅓ grain, Salicylic Acid 1½ grains, Menthol, 1 grain.

Pills of Sodium Oleate 1 grain, Salicylic Acid 1½ grains, Phenolphthalein ½ grain, become oily owing to double decomposition between the first two. Mass the phenolphthalein and the Acid with anhydrous wool fat and then the Sodium Oleate in dry powder with the same excipient, mix and stiffen with Althea or Kaolin.—P.J. ii./08,802.

An antiseptic cholagogue combination valuable for gallstones. The Menthol and Phenolphthalein regulate intestinal activity.

Wounds treated by 2½% Soft Soap Solution useful.—L. ii./17,789. Castile Soap has also been used. *See* also **Wounds.**

Cholelysin said to be composed of a mixture of Sodium Oleate 10 to 15, Validol 5, Valerian Tincture 10 and Peppermint Water to 200 For use in gall-stones. **Tablets** are made.

Sapo Superadipatus, Ph. Ned.
Anhydrous Wool Fat 4, Potash Soap 20, Hard Soap 76.

Sapo Superadipatus cum Pice Liquida, Ph. Ned.
Anhydrous Wool Fat 4, Liquid Tar 5, Potash Soap 15, Hard Soap 76.

Sapo Superadipatus cum Sulfure Precipitato, Ph. Ned.
Anhydrous Wool Fat 4, Precipitated Sulphur 10, Potash Soap 20, Hard Soap 66.

Sapo Mollis Peroleatus.—Tallow 32, Olive Oil 5, Potassium Hydroxide 3, Sodium Hydroxide 2, Borax ¼, Distilled Water 100. Dissolve the Potassium and Sodium Hydroxides and Borax in Water, then heat to boiling, add the tallow and oil—boil until well saponified and proper consistency when cold. —C.D. i./10,79, ex Edinburgh Infirmary Pharm.

To Soften Water, *i.e.*, to precipitate the dissolved Calcium Salts, so as to prevent them forming insoluble soaps during the lathering process, a small proportion of Sodium or Potassium Carbonate may be added to the water. Filtration through wood ashes was formerly used for laundry work.

For consideration of **chalky** and other types of **waters,** see *Vol. II.*

Medicated Soaps.

Ⓟ Asepso, 3% Mercuric Biniodide.
Ⓟ Biniodide, containing ½%, 1% and 3% mercuric potassium iodide, reliable antiseptic.
Carbolic, toilet and medicinal, strength 5%, 10% and 20%.
Formosyl toilet and medical 10%.
Ichthyol 5% and 10%, in skin affections.
Ichthyol and Salicylic Acid
,, ,, Sulphur 5% each
Lanolin and Ichthyol.
✱ Resinol.
✱ Sphagnol 5 and 15%.
Ⓟ Sublimate 1%.
Sulphur, Camphor and Balsam of Peru, of each 5%.
Sulphur, Camphor, and Carbolic Acid, of each 5%.
✱ Vinolia, medical.
✱ Wright's Coal Tar contains the equivalent of 15% of phenol combined to be unirritating. The oils for scenting purposes are selected so as to be of the highest antiseptic value, containing amongst other important essentia oil constituents, thymol, carvacrol and cinnamic aldehyde.—*c.f.* Antiseptic powers of Essential Oils, *Vol. II.*

For details of the manufacture of **Medicated Soaps** (direct from Cocoa Nut Oil and Soda Lye), *vide* E.P., XV., p. 713.

Linimentum Saponis (*Off.*). Soft Soap 4, Camphor 2, Oil of Rosemary 0·75, Distilled Water 8·5, Alcohol 90% to 50.

Spiritus Saponis Kalinus (SPIRITUS SAPONATUS, P.G.V.).

Is prepared by saponifying Olive Oil 6, with Liquor Potassæ (15%) 7, and Alcohol 7½ in a stoppered vessel by frequent agitation. A small quantity of this product should mix clear with alcohol and water. Add then Alcohol 22½ and Water 17 ; filter.

Soap and Spirit Lotion. Soft Soap 1, in Alcohol 90% *q.s.* to 2.

Ether Soap.

Dissolve Soft Soap 32 in Alcohol (90%) 20, allow them to stand 24 hours and decant carefully from any sediment, then add Methylated Ether Sp. Gr. 0·720, 52 parts. As a detergent prior to operation.

Ⓟ**Ether Soap with Mercuric Iodide,** contains 1 in 1,800.

Mercuric Iodide 25 grains, Potassium Iodide ½ ounce, Soft Soap 2 lbs., Alcohol 90% 1 pint, Ether *q.s.* to 5 pints.

✱ **Formosyl Glycerin Soap.** (*Distinguish from 'Formosyl.'*)

A yellowish liquid (prepared scented and unscented) containing 40% of Glycerin. A bland and soothing preparation for delicate skins. It is a constituent of **Salicifrice.**

Liquid Surgical Soap (Wilbert).—Dissolve Potassium Hydroxide 4 with Sodium Hydroxide 4, in Water 25; to this add Alcohol 25, and saponify with Cotton Seed Oil 50 (added in three or four portions), finally making the product 250 with distilled water. The mixed Potash and Sodium Soaps are more soluble and stable than soap made with either constituent alone—only 10% of Alcohol is necessary. Distilled Hamamelis Extract, Rose Water, &c., may substitute part of the water for toilet purposes.—P.J. ii./07,382.

Recent trial by us of this formula gave satisfaction. Saponification must be conducted by heat.

✱**Sterilla** (T.M. 300899).—Liquid Surgical Antiseptic Soap.—B.M.J. i./09,412.

Synol Soap.—A liquid soap containing Cresols and Camphor. For surgical and general use.

Acetone Soap.

Mix Green Soft Soap 25 with Water 30, and add Acetone 45. For surgeons' use. It is more economical than a spirit preparation.

SARSÆ RADIX, SARSAPARILLA.

The dried root of *Smilax ornata* (B.P. 1898). (*Liliaceæ.*)

Imported from Costa Rica and known as Jamaica Sarsaparilla. U.S. defines *Smilax medica* (Chamisso and Schlechtendal), known in commerce as Mexican Sarsaparilla; or *S. Officinalis* Kunth or an undetermined species of *S.*, known as Honduras Sarsaparilla; or *S. Ornata* (Hooker filius), known as Jamaica Sarsaparilla—*N.O. Liliaceæ.* Lima Sarsaparilla imported from Panama is considered best commercially, that from Honduras being of second quality.

Constituents.—Jamaica Sarsaparilla contains but one definite saponin glucoside, *viz.*, Sarsasaponin, accompanied by a phytosterolin (sitosterol-d-glucoside), which represents a class of compounds that till recently was not known to occur in plants. Parillin appears to be a mixture of Sarsasaponin and a phytosterolin; Smilacin is not homogeneous but contains Sarsasaponin, together with indefinite amorphous products.—Power and Salway.—J.C.S.T. i./14,219

Extractum Sarsæ Liquidum. (B.P. 1898). **U.S. 1 = 1.**

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

Liquor Sarsæ Compositus Concentratus. (B.P. 1898)

Dose.—2 to 8 drachms (**8 to 15 Cc.**).

Uses.—Sarsaparilla is employed mostly in conjunction with other drugs in chronic rheumatism, in skin affections and as a "blood purifier." It has been used in the treatment of syphilis. Sarsaparilla is not now *Off.*

Sarsaparilla was of doubtful medicinal value even 150 years ago.—P.J. i./16,297.

Incompatible with Alkalis.

Decoctum Zittmanni Fortius.

Dose.—3 to 6 ounces (**90 to 180 Cc.**).

Sarsaparilla (cut small) 200, Water 5,200, maintain at 35° to 40° C. for 24 hours, then add Potash Alum 10, Calomel 8, Precipitated Cinnabar 2. Heat on a water-bath for three hours and add Bruised Anise and Fennel of each 10, Senna leaves (cut small) 50, Liquorice Root (cut small) 20. Continue heating for 15 minutes, strain, and press, passing sufficient water through the marc to make up to 5,000.

Decoctum Zittmanni Mitius.

Dose.—3 to 6 ounces (**90 to 180 Cc.**).

Sarsaparilla 100, Water 5,200, Lemon Peel, Cassia Bark, Cardamoms and Liquorice of each 6. Proceed as in making the stronger decoction.

Both these preparations have been used in syphilis and wasting diseases.

SCAMMONIÆ RADIX. (*Off.* and B.P. 1898).

Dried root of *Convolvulus Scammonia* (*Convolvulaceæ*), containing about 10% Resin and 15% Sugar.

Scammonium, (B.P. 1898, not now *Off.*).

Dose.—5 to 10 grains. Emulsifies with water.

The gum resin exuding from the living root on incision.

Scammoniæ Resina. (*Off.*).

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**). Prepared by exhausting the root or Orizaba Jalap with Alcohol 90% and pouring the concentrated tincture into water in a thin stream. Occurs in greenish lumps. Soluble almost entirely in Alcohol and Ether. **Scammonin** is this substance purified.

Uses.—Purgative in obstinate constipation. Produces copious watery evacuation in a few hours. Does not act until reaching the duodenum.

For further details of C. Scammonia and Ipomœa Orizabensis see Vol. II.

SENNA (*Off.*).

The dried leaflets of either *Cassia acutifolia* (Alexandrian) or *Cassia angustifolia* (N.O. *Leguminosæ*) (East Indian or Tinnevelly). The activity of the drug is stated to be due to Cathartic Acid. Constituents are Emodin (Tri-oxy-methyl-anthraquinone), Chrysophanic Acid and Gluco-sennin, etc. In addition, the **legumes or fruit, Sennæ Fructus** *Off.*, of both these varieties are in use for making infusions and other preparations. These are stronger than the leaves. —Tschirch. Clinical experience has shown that the legumes are more active if *green*—as distinct from the brown colour—in which they are usually supplied.—W. H. M. **P. Austr.** especially refers to *Fructus* (*Folliculi*) of Alexandrian Senna.

Senna is the ideal cathartic.—J. C. McWalter, P J. ii./12,671.

With aid of radio-graphic pictures it is shown that Senna (infusion) acts only on the colon (peristalsis of). It has little or no action on peristalsis of the small intestine and stomach. As soon as the Senna reaches the cæcum and the ascending colon, the colon is almost completely emptied. This is repeated several times as long as there is Senna in the intestine or passes into the cæcum.—Münch. Med Woch., No. 27, 1910, p. 1438.

Confectio Sennæ (*Off.*).—*Syn.* LENITIVE ELECTUARY. *Dose.*—60 to 120 grains (**4 to 8 Gm.**).

Contains Senna 10% with Coriander, Figs, Tamarind, Cassia Pulp, Prunes, Extract of Liquorice, Sugar and Coriander. The use of 0·5% Coriander Oil instead of fruit would prevent grittiness in taste.

Elixir Sennæ, B.P.C., 1901. *Syn.* LIQUOR SENNÆ DULCIS.
Dose.—1 to 3 drachms.

Moisten Alexandrian Senna 1 lb. in a mixture of Alcohol (90%) 4 ounces, and Water 12 ounces. Pack tightly in a closed vessel and macerate three days; express and pour the product on sugar 12 ounces in coarse powder. Break up the marc and add to it sufficient menstruum to furnish in all 16 ounces of product. Express again after 24 hours maceration, add the liquor to the previously obtained product and the sugar, heat in a closed vessel by a water bath of 200° F. and maintain at that temperature for ten minutes. When cold strain and add mixed Chloroform 24 minims, Oil of Coriander 2½ minims, Tincture of Capsicum ½ drachm, Alcohol (90%) 3 drachms; agitate thoroughly and if necessary add Alcohol 60% to make volume 24 ounces.

In this preparation the Cathartic Acid, not being subjected to long exposure to heat, is preserved from oxidation; **Cathartic Acid** is sometimes prescribed in doses of 4 to 8 grains in pills but is unstable.

Fluidextractum Sennæ. U.S. 1=1. By alcoholic percolation.
Average dose.—30 minims (2 Cc.).

Extractum Sennæ (Leguminum) Liquidum, B.P.C.
Dose.—1 to 2 drachms.

Senna Pods 16 ounces, bruised, are twice macerated with a mixture of Alcohol 90% and Water in the proportion of 2 to 1, pressing after each maceration, heating to 94° C. 10 minutes, and making up volume if necessary to 16 ounces.

R. Stockman concluded by comparing effects of preparations from the whole fruit, from the *pericarp freed from seeds* and from the uncrushed seeds that the second is best.—B.M.J. ii./15,128.

Elixir Sennæ Leguminum, *Martindale.* *Dose.*—1 to 3 drachms, is prepared, as Elixir Sennæ, B.P.C. 1901, *vide antea*, using legumes instead of leaves.

Calcium Tartrate is found in infusion of Senna deposit. It is formed after the infusion has been made. Senna Leaves do not contain any crystals that can be identified as Calcium Tartrate. The crystals seen are Calcium Oxalate. —T. E. Wallis, P.J. ii./12,646, see also P.J. ii./11,884.

Mistura Sennæ Composita.—*Syn.* BLACK DRAUGHT (*Off.*)
Dose.—1 to 2 ounces (**30 to 60 Cc.**).

Flavoring.—Syl Lavandulæ, Syl Rosæ, Glyl Coriandri, Glyl Vanillæ (best); Syrupus Aromaticus (full dose)

Syrupus Sennæ (*Off.*).
Dose.—½ to 2 drachms (**2 to 8 Cc.**).

1 drachm = ½ drachm of leaves approximately with Oil of Coriander as carminative. U.S. has Fluid extract 50, Coriander Oil 1, Syrup to 200.

Tinctura Sennæ Composita (*Off.* and B.P., 1898).
Dose.—½ to 1 drachm repeated; 2 to 4 drachms for a single dose. Senna 1 in 5 with carminatives. Glycerin now *vice* Raisins.

Flavoring.—Syl Vanillæ, Syl Rosæ; Glycerin, Syrupus Aurantii.

Tinctura Sennæ Leguminum. The same strength as above using legumes in place of leaves.

Sennatin.—*Dose.*—Subcutaneously or intramuscularly—15 to 45 minims (1 to 3 Cc.). Stated to contain the active principles of Senna in Solution. Employed as "hypodermic purgative."

SINAPIS.

Mustard.

The dried ripe seeds of *Brassica nigra* (*Semen Sinapis,* P.G.V., P. Austr.) and *B. alba* (*N.O. Cruciferæ*), powdered and mixed. The condiment sold as mustard consists of this mixture from which most of the oil has been expressed and the cortical portion of the black seed has been removed.

Uses.—In cases of poisoning a tablespoonful in half-a-pint of warm water is an emetic. In small doses is a stomachic and appetiser. Externally a counter irritant when applied as a poultice, or added to hot water and used as a foot bath. It may blister tender skins.

Charta Sinapis. B.P. '98, is made with bruised black and white mustard seeds exhausted of fixed oil, made adherent with **Liquor Caoutchouc**. The oil being removed, the glucoside is more readily attacked by the ferment.

Linimentum Sinapis (*Off.*).

Volatile Oil of Mustard 3·5% in a Castor Oil, Camphor and Alcohol mixture.

Oleum Sinapis Expressum. Rubefacient. Sp. Gr. 0·921 to 0·923.

Oleum Sinapis Volatile.

Average dose.—$\frac{1}{8}$ minim (U.S.).

Consists principally of Allyl-iso-sulphocyanide. Fr. Cx. makes the chemical synonymous with **Oleum Sinapis Aethereale.** *Syn.* Allyl-iso-thiocyanide (*v. antea*), Sp. Gr. 1·014 to 1·025. *Off.* and U.S. requires a content of 92% of this substance. *Soluble* about 1 in 50 of water, readily in ether and alcohol. This solution is suitable as a rubefacient.

Volatile Oil of Black Mustard is a powerful antiseptic and when much diluted has been successfully used for sterilising the hands of the surgeon. *Cochlearia Armoracia*, radish, turnip, watercress, contain mustard oils.—Wild, P.R.S.M., Dec. 10, Ther. Sec., Dec. /10, p. 19.

Allyl isothiocyanide, physiological action of. Minimum fatal dose was found to be $\frac{1}{5}$ minim per kilo body weight.—L. ii./09,36.

Cannot be recommended for internal use.—L. ii./09,302.

Excessive inhalation into the nostril of the essential oil would be dangerous.—B.M.J. i./15,956.

Allyl Compounds, Allyl Sulphide, Allyl Isothiocyanide, Acetate and Allyl Alcohol investigated as to action on rabbits and pithed frogs—the isothiocyanide is most powerful and the Acetate the least. The poisonousness is due to the Allyl contained. They all affect the respiratory system chiefly and the circulation less. A complete research into the physiological action of these bodies.—B.M.J. ii./11,609. *Vide* also Oleum Allii Essentiale.

Spiritus Sinapis, P.G.V. Oil (volatile) 1 to Alcohol (90%) 49.

Thiosinamin.—*Syn.* Rhodallin, Allyl-thio-urea, Allyl-Sulpho-carbamide. $SC.NH.C_3H_5NH_2$=116·164.

Dose.—Internally $\frac{1}{2}$ gradually increased to $1\frac{1}{2}$ grains **(0·03 to 0·1 Gm.)** (with caution—in capsule or alcoholic solution). Hypodermically $1\frac{1}{2}$ to 3 grains as in the form of **Fibrolysin** or **Injectio Thiosinamin et Antipyrin.**

(T.M.: Fibrolysin is no longer a Trade Mark. No. 271208 expired 1919 through non-payment of fees. Fibrolysan No. 319529/1909, is also wound up).

Manufacture.—To essential oil of mustard 456 Gm. add in portions strong solution of ammonia 200 Gm. in Alcohol 200 Cc. The mixture becomes hot (or slight warming may be required to promote interaction)—cool down below 40° C. and shake until the odour of the mustard oil disappears. Evaporate at 40° C. to about 650 Gm. and leave to crystallise. Recrystallise from water. The crystals have melting point 74° C. Evaporate mother liquor and wash further crop of crystals with water and then with ether. Slight modifications of this process will be necessary as experience shows. Our own experience is that the purity of essential oil of mustard available during the war has left much to be desired, with the result that a considerable portion of the oil is not converted into the amine, and hence the yield has been poor.

Soluble in water 1 in 18, alcohol about 1 in 2, and in ether.

Flavoring.—It is practically void of taste.

Uses.—Hypodermically for lupus and uterine affections. Its application by subcutaneous injection softens scar tissue (10 to 15 minim dose of 10% solution in glycerin); strictures of the gullet have been relieved by this treatment. Has been used for keloid and in scleroderma.

Relieves traumatic stricture of the parotid duct.—B.M.J.E. i./06,71.

Tinnitus aurium treated by 5% aqueous solution hypodermically with improvement, dose being increased from 6 to 35 minims, also a 10% solution and a 20% Glycerin Solution. Should be tried before operating on the middle ear or labyrinth for this trouble.—B.M.J. ii./09,1135.

Pericardial adhesions have been treated by 3 grain doses in 80 minims of water, every other day in the flanks, for 30 days.

A case of scar keloid resulting from a burn received 5 injections of Thiosinamin of 0·2 Gm. with each, 1 days interval. Produced poisoning symptoms, sweating, headache (lasting 2 to 8 days). Ultimately the treatment was curative (after 18 injections).—Münch, Med. Woch., No. 29,1910, p. 1550.

Caution is needed whenever the patient experiences headache after the first injection of Thiosinamin.—M.A., 1911, p. 54.

To our knowledge the injection of Thiosinamin preparations may cause transient poisonous symptoms. J. Craig informs us these are due to its action on nerve centres.

Injectio Thiosinamin et Sodii Salicylatis.

Dose.—1 to 2 Cc. every two or three days.

Sterules of this *Compound Thiosinamin Injection* prepared with a special solvent are made 1 and 2 Cc. for use either intramuscularly or hypodermically, and sometimes intravenously, are prepared. 1 Cc. contains approximately 0·06 Gm. (1 grain) of Thiosinamin and 0·09 Gm.—1½ grains—approx. of Sodium Salicylate.

Uses.—For relaxing scar tissue, in strictures of the urethra and rectum, in stenosis of the pylorus, rheumatoid arthritis, Dupuytren's contraction and eye affections (corneal infiltrations). Massage and stretching or the use of bougies in appropriate cases may be of value. Also in middle ear disease and for tinnitus—but the "remote action" in such is doubtful, and in pleural adhesions injected locally, or into the gluteal muscles once or twice weekly according to severity of case.

Injectio Thiosinamin et Phenazoni.—**Martindale.** *Syn.* CICATRICINE.

Dose.—8 to 15 minims (½ to 1 Cc.). = 1½ grains to 3 grains (0·1 to 0·2 Gm.) Thiosinamin, 2½ to 5 grains (0·16 to 0·3 Gm.) Phenazone and 1/20 to 1/10 grain Eucaine Lactate approximately.

Thiosinamin 20, Antipyrin 33, Eucaine Lactate 0·65, Water to 100.

This preparation contains the Thiosinamin and Phenazone in equimolecular proportions. These amounts give the most soluble combination.

It has been used in the treatment of cicatricial tissue. It should form a useful injection, being non-toxic and non-irritating.

Patents :—
Other substances have the power of furnishing concentrated aqueous solutions of Thiosinamin, which keep well and are suitable for therapeutic purposes. Sodium Biborate, Urethane, Benzoates, Cinnamates, Glycocoll, etc.—Subject of Patent 29,247/1909.

This patent is apparently void—not proceeded with. Patent 22,533/1905 would now have lapsed by time.

Unguentum Thiosinamin. *Martindale.*

Thiosinamin 1, Oleum Anseris Benzoatum to 10. In warm weather 5 or 10% of White Wax may be necessary. For carrying out the thiosinamin treatment by external application.

Unguentum Thiosinamin et Antipyrin.—Thiosinamin 10%, Antipyrin 16·5%, in Oleum Anseris Benzoatum. Similar in use.

'Anserine' Mulls of Thiosinamin are prepared 10% strength.

Tiodine, *Syn.* **Thiodin. Thiosinamin-ethyl-iodide.**

$S = C(NH.C_3H_5)(NH_2\ C_2H_5I) = 272{\cdot}134.$

Prepared by heating Thiosinamin and Ethyl Iodide under a reflex condenser. Forms white crystals melting at 68° C. *Soluble* readily in water and 1 in 1 in Alcohol (by our experiment).

Ampoules are prepared containing 3 grains (**0·2 Gm.**) of Tiodine. *Dose.*—The contents of one ampoule every other day.

✶**Iodolysin** (T.M. 312678).—A similar preparation, stated to contain 43% Thiosinamin and 47% Iodine. **Iodolysin Solution** for oral use, 30 minims, containing 1 grain Thiosinamin and 1 grain Iodine, also **Injection** (hypodermic), 15 minims, containing 1½ grains of each. **Ointment** and **Pigment** (local) are prepared. To soften cicatrices and promote absorption of fibrous tissue,—œsophageal and urethral strictures, in chronic arthritis, arteriosclerosis, deafness and paralysis.

SODIUM.

Na=23·00.

A soft white metal, decomposing water. Is prevented from oxidisation by keeping under mineral naphtha.

Is employed in making Liquor Sodii Ethylatis (*q.v.*).

For a further note on Metallic Sodium and a Reagent for detecting Sodium Compounds, see Vol. II.

Uses of Sodium Salts.—These are thought to be less depressing to the heart muscles and nervous system than the corresponding Salts of Potassium, hence the Bromide, Iodide and Chlorate of Sodium are preferred as medicines.

Sodii Acetas.

$CH_3COONa,3H_2O = 136{\cdot}082.$ *Average dose.*—15 grains.

Colourless crystals or white powder. Soluble in water about 1 in 1 with alkaline reaction, and about 1 in 35 in alcohol 90%. Is rarely used medicinally. According to U.S. should contain 99·5% pure Sodium Acetate of the above formula.

Flavoring—Glyl Pini, Syl Lavandulæ; Syrupus Aurantii.

Sodii Chloridum. NaCl=58·46 *Dose.*—10 to 60 grains (**0·6 to 4·0 Gm.**). White cubical crystals.

Soluble 1 in $2\frac{3}{4}$ of water (not more in boiling water) very slightly in Alcohol 90% (about 1 in 200). It produces neither rise in temperature on dissolving (exothermic), nor diminution (endothermic),—it is therefore equally soluble in either hot or cold water.

Flavoring.—Syl Coriandri, Syl Menthæ Piperitæ (double dose), Syrupus Zingiberis.

Uses.—Although in common use is not requisite to those having ordinary mixed diet, but is necessary to vegetarians. Given in excess leads to scurvy, while a want of sufficient salt leads to anæmia, debility and œdema of face and ankles. Large doses are emetic and may relax the bowels.

As a *purgative* may be given in dose of 120-240 grains. As a laxative. 75 grains in a tumbler of cold water, it is stated, acts efficiently and without pain. Rectal injections are used to kill threadworms. Hypodermically or into the veins as Normal (Physiological) Saline Solution *q.v.*

The manufacture of varieties of Common Salt, Hodgkinson's process.—Na., Mar., 1911,60.

Saline Waters and Common Salt. Both men and animals take salt, not because they need it, but because the taste has been acquired—by human beings in early life. Considering the various 'salts in the body,' it is strange that this one only is taken so largely. Estimating that Sodium Chloride forms 1/200 of the body, this would be 320 Gm. for a 64 kilo person. It is common for a man to take an average of 20 Gm. daily. About 2 to 3 Gm. is sufficient. The excess may be harmful, leading to morning diarrhœa, chronic eczema, psoriasis, etc. Some of the chronic diseases of middle and late life are caused by abuse of salt. It stands to disease as foul air does to respiratory diseases—P.R.S.M.—Feb. '10, Baln. Sectn., p. 59, *et seq.* Probably individuality has a good deal to do with it. Many persons take large amounts with apparently no ill effect and, *per contra*, many appear healthy on practically nil.—W. H. M.

The taking of large doses of common salt may enable the body to lose correspondingly large amounts of Potassium. When the weight of the body increases, the excretion of Potassium is likely to increase also. It has been put forward that the larger the amount of Potassium in the body the larger is the breaking up of sugars and starches, so that in this case there is a decrease in the tendency to form fat and, therefore, to gain in weight. In this connection, Sodium is different,—there is no increased loss of Sodium when the body gains in weight. Potassium seems to be an element which tends rather rapidly to leave the body than to remain in it.—P.J. i./11,803.

Saline Solution, Normal. Physiological Salt Solution.

This should be isotonic with the liquid of the blood corpuscles and possess the same osmotic pressure as the liquor sanguinis. For ***man a solution of sodium chloride 0·9%, or approximately 80 grains to the pint*** of boiled water, freezes at closely—0·56° C., is generally used for intravenous injection in hæmorrhage, uterine flooding, or collapse.

Ringer's Solution. There were several formulæ. Mostly used now is Sodium Chloride 0·8, Potassium Chloride 0·0075, Calcium Chloride 0·01 Sodium Bicarbonate 0·01, Distilled Water to 100. To have the above freezing point should be composed of Sodium Chloride 0·88, Potassium Chloride 0·025, Calcium Chloride 0·02, Sodium Bicarbonate 0·015, Distilled Water to 100.—P.J. i./12,357.

Ringer's original solution resembled frog's blood in its saline composition. Locke altered the composition of the salts contained, increasing the Sodium Chloride from 0·6 to 0·9% and adding Glucose. The cerebro-spinal fluid of man is virtually this modification.—W. D. Halliburton, B.M.J. ii;/16,609.

Locke's Solution contains Sodium Chloride 0·9, Potassium Chloride 0·042, Calcium Chloride 0·024, Sodium Bicarbonate 0·05, Dextrose 0·1%.—P.J i./15,410.

Fischer's Modified Ringer's Solution.

Sodium Chloride 0·5, Calcium Chloride 0·04, Potassium Chloride 0·02, Distilled Water to 100. This is employed in surgical practice instead of Normal Saline, *e.g.*, for dissolving Kerocain.

The injection should be conducted at about 105° F., into any convenient vein, the rate of injection varies greatly according to the circumstances, it may be as rapid as a pint in ten minutes, or as slow as 8 ounces per hour (see refs. *infra.*). Injections are also made into the rectum.

NOTE.—The **Lacrymal Secretion** is stated to contain 1·3% Sodium Chloride and 0·5% Albumin. It has been suggested to make eye lotions isotonic.

Liquor Sodii Chloridi Physiologicus U.S. IX. 0·85%. A sterile solution made by heating preferably in an autoclave at 115 to 120° C. for 15 minutes or by boiling for at least one hour, which should not be used more than 48 hours after preparation.

Serum Factitium, P. Belg., is 0·8%.

P.G.V , Solutio Natrii Chlorati Physiologica has sodium chloride 0·8 with Sodium Carbonate 0·015% (*w/w*). Sterilised under pressure.

Fortunately only an approximation to an isotonic solution is necessary, as mucous membranes are practically insusceptible to changes in osmotic pressure within fairly wide limits. The solution should be slightly alkalised. 0·1% Sodium Bicarbonate is sufficient.—Marshall, '08.

Saline Solution Sterules contain in saturated solution sufficient for two pints, hermetically sealed. Are convenient for carrying in the surgical bag.—L. i./99,35 ; ii./00,1866.

'Solubes' Sodium Chloride, 20 grains each, are useful for producing extemporaneously 5 ounces of a normal saline solution.

Sodium Chloride Shells.—Xylonite Boxes containing 80 grains of Sterile Salt for 1 pint of Normal Saline Solution are convenient for the operating bag.

Uses and References.—Largely employed in surgical shock by intravenous and rectal injection ; also in post partum hæmorrhage. Particularly useful in the hæmorrhage of typhoid. Also aids recovery from poisoning by Carbolic Acid, Morphine and Alcohol. Vomiting, recurrent of infants (given per rectum or subcutaneously), pneumonia, uræmia, relapsing fever, delirium tremens, tetanus and diphtheria have been well treated by subcutaneous and intravenous use.

Injections into the cellular tissue, during shock, preferable to intravenous injections, because if the fluid does not find its way into the vessels from the cellular tissues an attempt to force it into a vein is likely to prove either futile or, indeed, harmful.—L. i./07,499.

A 10-gallon uterine and vaginal douche of hot normal Saline in a case of gangrene of the vulva, vagina and cervix.—B.M.J.E. ii./09,43.

Eclampsia has been treated by intravenous injection in severe cases, but the treatment is condemned by others as being dangerous, especially where kidneys are involved.—Pres., Jan., 1911. p. 3.

For cholera.—B.M.J. i./11,760.

Post-operative treatment in appendicitis Rectal injection of Saline—at rate of 1 drop a second, *i.e.*, 1 litre in about 5 hours. Drugs may be added to the fluid without taxing the stomach, *e.g.*, Adrenalin Solution up to 10 minims *per diem*, Digitalis, Strophanthus, etc. Glucose 2 to 5 per cent. may be included as nutrient. The most reliable and valuable therapeutic agent.—F. G. Barlow-Eberhardt. Pr., Oct., 1912,534.

Rectal injections of Saline 2 pints to which Aspirin 15 grains and

Brandy 1 ounce were added, following operation in consequence of traumatic rupture of the spleen.—W. H. Cam, B.M.J. i./16,200.

Transfusion Apparatus, *vide* also p. 198.

For a child that is collapsed, and for an adult also, though to a less extent, it is absolutely essential that the injection **should be hot,** *i.e.*, considerably warmer than the surrounding atmosphere. The statement (from a previous paper) that 7 ounces of Saline starting at 120° F. (*i e.*. allowing 15° for loss in transit through the tubing) during two hours, provides an injection at 105° F. is doubted in this communication, in fact it is proved experimentally to be erroneous,—the child actually gets the injection at 75 to 77° F. (atmospheric temperature being 64° F.). A child, as a rule, takes the 7 ozs. in less than two hours. It was *found that a temperature of* 194° was necessary under these conditions to produce an injection at actually 105° F. A new type of apparatus based on the **Vacuum Flask principle** is described. Points—short length of pressure tubing (10 inches) "Y" piece to enable transfusion at two places. This apparatus if filled with Saline at 135° F., allowed to flow at 8 ounces in an hour, insures an infant getting the "Saline" at 104° F —N. Stuart Carruthers, B.M.J. ii./11,725.

✱ **Steriloid Jacket.**—This apparatus is designed for giving continuous saline injections either per rectum or subcutaneously. The saline is admitted very slowly—the 2 pints or more may be spread over 48 hours or more. The liquid in the glass vessel is kept at 120° F., and can be adjusted at will—cooling to at or about blood heat as it passes through the tube—the object being to avoid administering the injection too cold. The exact temperature of the injection clearly depends on the rate of flow.—J. Jackson Clarke, L. ii./13,938.

Hypertonic Saline Solution.—Sodium Chloride 5% in distilled water with ½% Sodium Citrate added (the proportion is sometimes varied up to 10% of salt and 1% Sodium Citrate).

Based on the well-known theory that the patient's blood fluids and the white corpuscles are the only bactericides to be counted upon, the idea, broadly speaking, of the Hypertonic Saline treatment is to promote active lymph flow from the wound by the use of this solution and the provision of ample mechanical drainage.

The process classed by Sir A. E. Wright as a "Treatment by Physiological Methods" quickly causes dirty wounds to become healthy. The salt quickly brings osmotic force into play—the Citrate being added to decalcify and render the outflowing lymph incoagulable. For dry, sloughing and for gas gangrene wounds the solution has been used with success.

Hypertonic Saline and Normal Saline are called Phylacogogic Agents, the former being a lymphagogic and the latter a leucocytagogic agent.

Sir A. E. Wright (and co-workers) have not come across any satisfactory evidence, bacteriological or clinical, of the utility of antiseptics as employed in infected wounds. The antiseptic treatment of these wounds according to this authority, has completely broken down. It is to be noted, however, that 2% Sodium Chloride solution inhibits and 5% completely arrests the growth of pyogenic organisms. The latter strength will by itself—and this is to be borne in mind in connection with proposals to combine with carbolic acid—prevent any growth of microbes in the wound.—L. ii./15,1063.

For a full account vide Sir A. E. Wright, L. i./15,737,787,843,897; ii./15,957,1009,1063; i./16,1203.

Sir G. H. Makins in the Hunterian Oration 1917, defines the method as seeking (1) to maintain the patency of the opened up lymphatic vessels and spaces which normally undergo closure in the same manner as the wounded blood-vessels and to encourage an increased flow of lymph from the wound surface with the objects:—(*a*) to effect a natural lavage of the tissues; (*b*) to maintain an outward current in the flow and thus oppose the entrance of microbes into the tissues; (*c*) to utilise the bactericidal properties of the fluid; (*d*) to remove exhausted lymph from the tissues in place of leaving it to return by the normal route of the lymphatic circulation; (*e*) to maintain a moist surface to the wound and wash away débris of devitalised tissue and bacteria. In this last particular simple irrigation on the part of the hypertonic or isotonic solutions plays an important part.

(2) At a later date to encourage and increase the number of migrating leucocytes both with the view of increasing phagocytosis and providing a sufficient supply of active trypsin to aid the separation of the sloughs.

The normal outflow of lymph is increased by the "drawing" of the hypertonic solution and the augmented migration of the leucocytes by similar alternate irrigation with the "isotonic" solution (Normal Saline). For criticism of the theory and comparison with antiseptic methods *vide* L.i./17,252.

Readily accessible wounds treated in this way soon gained a healthy appearance and lost offensive and purulent discharge. Hidden wounds could be treated with a salt "suppository."—Sir B. Moynehan, B.M.J. i./15,950.

Considered a failure (5% saline)—as evidence the temperature which is up and down for two or three weeks.—A. Wilson, B.M.J. i./15,825.

Other lymphagogue agents such as Glycerin and Carbolised Glucose have been added with success. Any beneficial action that any antiseptic may show in the interior of wounds or joints is due entirely to its power of inducing lymph lavage or chemiotaxis. "Tablet and Gauze" also Formalin-Glycerin praised in this article.—H. M. Gray, B.M.J. ii./15,32,40.

It is thought that the chief beneficial characteristics of strong salt solution apart from the cleansing property possessed by all watery solutions is its mild antiseptic action.—K. Taylor, B.M.J. ii./16,321.

In theory the method is excellent. In practice results varied. Requires careful watching. Not suitable for routine use in a Casualty Clearing Station nor even Base Hospital. The strong solution is extremely irritating, causing pain. Salt used to be rubbed into wounds made by the lash—*not* for its healing power. A dressing with it should not be covered with non-permeable tissue which will check outward flow of discharge which it causes.—Casualty Station Criticism.—A. Don, B.M.J. i./16,648.

Antiseptic Power of Hypertonic Saline.

Sir A. E. Wright found that 2% salt will begin to inhibit and 5% completely arrest the growth of pyogenic organisms. Use Sodium Citrate when the discharge is being confined by a dressing and omit it as unnecessary when washing away the pus.—W. C. Allardice, B.M.J. i./17,502. *See* also *ibid*. 76.

The inhibition of growth, *e.g.*, of *Staphylococcus pyogenes aureus* and *Bacillus Coli* by 5% hypertonic saline, experiments showed, is very slight. With 10 or 12% salt, there was no proliferation of the organisms in question.—L. Garrett Anderson and co-workers, L. i./16,1119.

In surgical shock a modified concentrated **Ringer Solution** might be tried, *e.g.*, Sodium Chloride 2, Potassium Chloride 0·05, Calcium Chloride 0·05, Water 100, and the value of increasing the Calcium content cautiously tested. —B.M.J. i./17,383.

Alkaline Hypertonic Saline (Hogan and Fisher).

Sodium Chloride 14, Sodium Carbonate (cryst.) 10, Water 1,000. For injection in gas gangrene.—B.M.J. i./17,383.

Salt Packs, *i.e.*, by packing wounds with Salt or Salt Tablets in gauze, have been much used, *vide Wounds*.

Answers to numerous questions on the Hypertonic treatment of gun shot wounds were favourable.—Col. H. M. W. Gray, B.M.J. i./16,6.

Trunecek's Serum for nervous ailments and high arterial tension. —B.M.J. ii./02,149.

Dose.—Subcutaneously 1 Cc. to commence with, increasing by 0·2 Cc. May also be given by rectum and mouth.

Sodium Chloride 492, Sodium Sulphate 44, Sodium Phosphate 15, Sodium Carbonate 21, Potassium Sulphate 40, Water *q.s.* to make 10,000.

Tablets of Trunecek's Serum are prepared 5 grains each, *i.e.*, equivalent approximately to 5 Cc. of the serum. *Daily dose* 3 to 6 with meals. Administration *per os* is equally effective.

For atheroma and sclerosis of arterial coats.—B.M.J.E. ii./04,43.

Trunecek's Serum has a freezing point—3·29° C. and an osmotic pressure 5·875 times greater than blood serum—*i.e.*, it is strongly hypertonic.—P.J. i./12,357.

Cheron's Serum.—Sodium Chloride 2, Phenol 1, Sodium Phosphate (Na_2HPO_4) (wrongly called Neutral Phosphate in France) 4, Sodium Sulphate 8, Distilled Water to 100.

Gelatin Saline and **Glucose Tubes** are described, pp. 422, 425.

Gum Acacia with Sodium Chloride to increase viscosity for intravenous injection, to replace blood lost by hæmorrhage see **Gum Acacia.**

Hayem's Solution. Sodium Chloride 5, Sodium Sulphate 10, Water 1,000. Sterilise. This must be distinguished from Hayem's Blood Examination Fluid.

Regenerative Tablets.

Dose.—6 Tablets daily, 2 at each meal. The mixed inorganic Salts of the normal blood, each Tablet containing Sodium Sulphate 0·04, Chloride 0·4, Carbonate 0·016, and Phosphate 0·012 Gm., with Magnesium Phosphate 0·016 and Calcium Glycerophosphate 0·012 Gm. Useful in the treatment of arteriosclerosis. Thought to exercise a reviving stimulating action upon the vessels and circulation—preferable to the customary Iodine treatment, as they are free from the lowering effect of that substance. High rectal injections of a solution of 10 Tablets to the pint of water (approximating normal artificial serum solution) have been practised. This method has proved of value in heat collapse, weakness from vomiting of alcoholism and pregnancy.

✱ **Antisclerosin** (T.M. 282999) **Tablets** have a similar use and composition.

Solubes Sodium Chloride Compound.

Sodium Chloride 40 grains, Potassium Chloride 2 grains, Calcium Chloride 1·3 grains.

Dose.—Two to the pint to make a slightly Hypertonic Solution; 4 make an approximately double normal strength Solution suitable for rectal injection.

In cholera (the collapse stage) and diarrhœa. Hypertonic Intravenous Injections of this Saline Solution, in addition give Calcium Permanganate *Drink* ½ to 2 grains increased up to 6 grains to the pint and *Pills* (Salol coated) of 2 grains.—L. Rogers, B.M.J. ii./10, 835; ii./11,631. Vide also page 537.

The high temperature in the reaction stage of cholera should be controlled by cold sponging and iced water rectal injections. Though the surface temperature may be normal the rectal temperature may be anything up to 106° F. Prevention of uræmia will be effected by diluting the blood to at least the normal point by isotonic salines, by use of blood pressure raising drugs such as Digitalin, Strophanthin, Caffeine, and the vaso-constrictors, Adrenalin, etc.

Two of the **Calcium Permanganate Pills** (*vide supra*) are to be given every ¼ hour for the first 3 hours and then every hour until the stools become green and less copious—which usually occurs within about 12 hours. —B.M J. ii./11,1342 ; L ii./11,1403 ; P.J. i./12,357.

Hypertonic Saline and Permanganate in 1,000 cases of cholera, the permanganate being given in large amount *per os* to destroy toxins in the bowel by oxidation—good results. Sodium Bicarbonate intravenously to rectify the almost constant reduction in the alkalinity of the blood in all stages of the disease; as much as 320 grains given. The amounts varied from 160 to 1,120 grains in those cases which recovered while in five successful cases 800 or more grains were injected before free secretion of urine was obtained.—Sir L. Rogers, L. ii./15,219.

For a consideration of Blood Pressure and Specific Gravity Estimations as a guide to Transfusions in Cholera, vide Blood Examination, Vol. II.

Sea Water. *Syn.* ISOTONIC PLASMA.—The injection of Sea water specially collected, diluted (isotonised) and *sterilised,* has been advocated for the diarrhœa of infants.

Uses.—Gastro-enteritis ("Summer complaint") as also eczema and digestive disorders and their sequelæ of adults have been well treated. The treatment has also been tried in psoriasis, syphilis, lupus, arthritis, adenitis and tuberculosis, and is practically identical with the recognised Saline Transfusion methods for treatment of shock.

Dose.—20 to 100 Cc. (⅔ to 3½ ounces) every two or three days, increased as required.

For *infants. Dose* 10 to 30 Cc. under the skin of the scapula every two or three days, increasing if necessary.

Site of Injection.—For adults the injection is made behind the great trochanter,—the needle being inserted deeply. The diluted sea water is allowed to flow in by gravitation in the usual way.

Artificial Sea Water.—The following has been advised for injection as enema :—

Sodium Chloride 27, Magnesium Chloride 3, Potassium Chloride 1, Magnesium Sulphate 1¾, Calcium Sulphate 1, Distilled Water to 1,000.

Enema Sodii Chloridi, N.E.H.

Sodium Chloride ½ ounce, Hot Water 10 ounces. Use from 1 to 6 ounces for children according to age.

Dechlorination or Salt-free Diet.

In nephritis this has been successful (in many forms of nephritis the kidneys fail to eliminate salt). Copious diuresis sets in, œdema disappears and remains more or less absent so long as the treatment is kept up. Food should be cooked without it. The salt-free diet is, however, often disappointing. It should be tried where heart and lungs are hampered by excessive œdema, and in migraine and chlorosis. The theory of salt retention does not, however, wholly explain œdema following gastro-enteritis in children nor all cases of œdema in Bright's disease.

Relative to the potash ingestion in vegetable food by the poor in Ireland there is a deficiency in the intake of Sodium Chloride—may account for prevalence of tuberculosis there. Many tubercular patients resent salt.—B.M.J i./07,866.

Pneumonia has been treated by Salt free diet and administration of Potassium Nitrate, *q.v.*

Epilepsy treated by Sodium Chloride reduction.—Reduce the salt in the diet and the absorption of Bromide will increase. The combined treatment, *e.g.*, with Bromide Tablets containing 2 grains of Salt and 18 grains of Bromide to be used to salt broth, satisfactory.—L. ii./12,918.

Baths of Common Salt (or Tidman's Sea Salt), about 2 pounds to each bath, act as a tonic and stimulant, *e.g.*, in chronic rheumatism.

Sal Marinum Artificiale.—Potassium Iodide 1, Potassium Bromide 1, Calcium Chloride 40, Magnesium Sulphate 200, Bay Salt 760.—Ph. Notes.

✱Cerebos (T.M. 227704) **Salt.**

Sodium Chloride with 4% of phosphates, mostly Calcium Phosphate, less deliquescent than 'Salt.' Is intended to replace the phosphates removed in the preparation of food.

Digestive Salt *Syn.* *PEPSALIA. (T.M. 90722).
This consists of Sodium Chloride and Pepsin.

Pulvis Sodii Chloridi Compositus.
Sodium Chloride 6, Potassium Chlorate 1, Alum 1, Boric Acid 1, Borax 6. A saltspoonful in a half tumbler of warm water as a gargle is very beneficial for inflamed conditions of the throat.

Sodii Bromidum. $NaBr = 102{\cdot}92$.
Dose.—5 to 30 grains (**0·3 to 2 Gm.**).
Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 6.

In slightly deliquescent granular white crystals, tasting like common salt; soluble 8 in 9 of water.

Flavoring.—Syl Menthæ Piperitæ, Glyl Coriandri; Syrupus Aromaticus (double dose), Syrupus Zingiberis.

Uses.—In epilepsy, insomnia, maniacal attacks, and hysteria. Full doses combat morphine habit.

A mixture of bromides in the proportion of sodium bromide 2, potassium bromide 2, and ammonium bromide 1, is said to have a better action than one salt alone.

Gowers suggested small regular dosage of sodium bromide, *e.g.*, with food, as substitute for the salt in the 'saltless' treatment of epilepsy. (*See also* Sodium Phosphate.) The theory is that diminishing the chloride increases the readiness with which bromide enters the blood stream and nerve elements. *c.f.* Dechlorination p. 702.

Epilepsy treated by Sodium Bromide with Borax. Maximum dose 20 grains of each thrice daily in barley water, at Magnull. Small doses of Pilocarpine added are useful.—B.M.J. ii./12,1449.

The 'hypo-chloridization' treatment of epilepsy at Claybury is effected by filling the salt-sellers for the worst epileptics with Bromide. The addition of 20 drops of Sal Volatile, or of five drops of Fowler's Solution, prevents the rash which often disfigures patients taking Bromide.—Pr., Dec., 1912.

Delirium tremens in America treated by subdura injection of 1% Sodium Bromide Solution after removing 50 or 60 Cc. of cerebro-spinal fluid. Delirium controlled. It is not stated whether any difficulty is experienced in performing lumbar puncture.—Boston Med & Surg Jl Oct. 30, 1913; L ii./13,1562.

Sal Bromatum Effervescens.—*Arzn.*
Dose.—60 to 120 grains (**4 to 8 Gm.**).

Potassium Bromide 400, Sodium Bromide 400, Ammonium Bromide 200, Sodium Bicarbonate 1,000, Citric Acid 380, Tartaric Acid 445, Sugar 175, all in powder, separately dried and sifted. Mix in above order, and moisten with Absolute Alcohol 300; sift the mass quickly through a coarse sieve and dry at 104° F

Sodii Bicarbonas. $NaHCO_3 = 84{\cdot}013$.
Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).

Occurs in small white crystals or powder. ***Soluble*** 1 in 11 of water; 20 parts are neutralised by 17 of Citric or 18 of Tartaric Acid. Is largely employed in dyspepsia and is of value in diabetes. A little rubbed on to the gum or placed in the cavity of a tooth, stops toothache. Large doses very useful in infantile vomiting; to neutralise the acid intoxication in these cases 100 grains are given when attack threatens, or smaller doses, *e.g.*, 10–15 grains every hour on premonition or attack commencing.

Incompatible with acids and acid salts, and with metallic and alkaloidal salts.

Bismuth, Magnesium and Lithium Benzoates and Salicylates are incompatible with Sodium Bicarbonate. It is also entirely incompatible with Aspirin. Acetates of Lead and Zinc liberate CO_2 from it; Diamorphine and Diacetyl Tannin do so also in small quantity. Use equivalent of Carbonate in dispensing, except in case of Aspirin.—P.J. i./17,9,257.

Flavoring.—Syl Lavandulæ, Syl Amygdalæ Amaræ; Syrupus Aurantii, Elixir Simplex.

Non-suppurative middle ear disease best treated by sterile solution injected with Eustachian catheter.—B.M.J. ii./04,1206.

For dyspeptic complaints, gout, rheumatism, etc., often prescribed, but discretion necessary. Often valuable in suppression of urine —Eustace Smith, B.M.J. i./09,263.

Diabetic coma treated by intravenous injection of 1 litre of 3 to 5% solution slowly (in ¼ to ½ hour).—B.M.J. i./09,667. **Isotonic Sodium Bicarbonate Solution** for this purpose is 1·35 Gm. with water *q.s.* to 100 Cc.—P.J. i./12, 357.

Functional disorders of the stomach: in hyperchlorhydria bodily rest essential, and neutralise increased acidity with 15 to 20 grain doses of Sodium Bicarbonate ½ hour after meals, best given with hydrocyanic acid or morphine.—B.M J i./09,600. Also for chronic ulcer of the stomach, of great value.

A Russian suggestion is that the presence of Nitric Acid is an important factor in the production of cholera. Benefit may be obtained by washing out the stomach with alkaline solutions.—Pres., 1910, p. 11.

Diabetes. Sodium Bicarbonate is recommended.—P.J. i./12,357.

In a normal person 2 drachms of Sodium Bicarbonate *per os* will usually render the urine alkaline in 24 hours. In chronic nephritis the effect is produced by the same dose, but in pregnancy toxæmia a larger dose is required —L. i./13,1366.

Collutorium Alkalinum Compositum, R.D.H.

Sodium Bicarbonate 15 grains, Sodium Chloride 10 grains, Sodium Salicylate 1 grain, Thymol, Menthol, ¼ grain each, Glycerin of Borax 1 drachm, Thymol Solution to 1 ounce. One part to be used in 4 of water.

For post-nasal catarrh.—Pr., Apl., '09,529.

Nebula Alkalina, T.H. Sodium Bicarbonate 15 grains, Borax 15 grains, Carbolic Acid 4 grains, Glycerin 45 minims, Water 1 ounce. **Dobell's Solution** is approx. half this strength. **C.L.T.E.** is also approx. half strength *sine* Glycerin. **Nebula Sodii Bicarbonatis, C.L.T.E.** Sodium Bicarbonate 20 grains, Glycerin 1 drachm, Water to 1 ounce.

Bain dit de Vichy. FR. Cx.

Sodium Bicarbonate 500 Gm. dissolve in the bath (250 to 300 litres) at time of use.

Sodii Carbonas. $Na_2CO_3,10H_2O=286{\cdot}165$.

Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).

Is prepared from Sodium Chloride either by (the Solvay or Ammonia process) interaction with Ammonium Bicarbonate and subsequent ignition (Sodium Bicarbonate is an intermediate product), or by converting it into Sodium Sulphate and the action of heat on a mixture of the Sulphate with Carbon and Calcium Carbonate (Leblanc process). It is soluble in less than 2 of water and effloresces in the air. Internally in gout and skin diseases and for 'acidity.' A **lotion**, 2 grains to the ounce, relieves eczema. 1% is used as mouth wash or nasal douche.

Instruments are boiled in a 1% solution to sterilise and to prevent rusting.

In diabetic coma the intravenous injection of 30 ounces of 3 to 4% solution affords best chance of restoring patient.—Pr. July, '07.

The dangers of intravenous injection of alkaline solutions, a case described which ended in death—a 5% Solution is stated to have been used.—L. ii./11, 960. These solutions would appear to be much too strong.—W. H. M.

For ringworm melt the end of a piece of ordinary washing soda the size of a walnut by holding against a red hot poker, and rub freely into the affected part (hair cut off if necessary). Practically painless and stated to be infallible. Apply Boric Ointment if necessary.—B.M.J. i./13,498.

Sodii Carbonas Exsiccatus.

Approximately 107 of the exsiccated salt are obtained from 284 of the crystals. The salt is seldom used internally as such.

Sodii Carbonas Monohydratus. *Syn.* **Sodii Sesquicarbonas** U.S. $Na_2CO_3H_2O = 124{\cdot}021$, is known in commerce as **Concentrated "Crystal Soda,"** and used as a Bath Salt—water softener. It occurs in small silky crystals.

Sodii Chloras, Sodium Chlorate. $NaClO_3 = 106{\cdot}46$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Caution.—Not to be rubbed with combustible substances. Colourless crystals with saline taste, soluble 1 in less than 2 parts of water, and 1 in 34 of 90% alcohol. Useful in diphtheria, stomatitis, sore throat, and in urethritis.

Tablets of Sodium Chlorate and Borax, 5 grains. Useful in loss of voice and relaxed throat.

Trochisci Sodii Chloratis, 3 grains in each (**0·2 Gm.**).

Made with black currant paste, and with plain sugar. More palatable than potassium chlorate.

Gargarisma Chlori. *Syn.* EUCHLORINE GARGLE.

Mix in a pint bottle Sodium Chlorate in powder, 10 grains (with Hydrochloric Acid, 30 minims) and let the gas generate and replace the air in the bottle, then cork the bottle, and let it stand for two minutes; lastly add gradually shaking after each addition, Distilled Water to 1 pint. This is a good antiseptic, *c.f. Vol. II.*

According to the hypothesis that $4NaClO_3$ (= 4 × 105·71) are decomposed by 12 HCl (= 12 × 36·19) yielding 12 Cl (= 12 × 35·19) (in part ? as ClO_2), this gargle contains about 10 grains of Chlorine, in other words it is about 0·125% Chlorine.

Useful to remove follicular patches, *e.g.*, in diphtheria 2 or 3 ounces in a quart jug may be used as an inhalation (cold).

Poisoning by Chlorine.—Useful suggestions for treatment will be found under Poisons at end of this volume—under paragraph *Gas.*

Sodii Citras. $2C_3H_4(OH)(COONa)_3 + 11H_2O = 714{\cdot}316$.

Dose.—10 to 60 grains (**0·6 to 4 Gm.**). Granular crystals or powder.

Solubility—1 in 3 of water. Is given as a cooling saline in preference to Potassium Citrate.

Flavoring.—Glyl Aurantii Amari, Syl Vanillæ.

Useful in azoturia, for it diminishes both polyuria and the loss of urea, and recommended for diabetes.

Intravenously Sodium Citrate gives rise to acute toxic symptoms. Fatal dose ranges from 0·4 to 1·6 Gm. per kilo body weight. Hypodermically may also be toxic—experiments on rabbits.—Salant & Wise, Jl. Biol. Chem.; J.C.S. 1917, 112 (1), 106; P.J. i./17,275.

Sodium Citrate Tablets.—5 and 10 grains.

For infant feeding :—(1) For weaning the healthy infant; (2) for increasing the amount of milk taken in the 24 hours; (3) for correcting milk dyspepsia (prevents clotting); (4) for the avoidance of scurvy —B.M.J. ii./05,1021.

In the case of a child 4 months old commence with proportion of 1 grain to the ounce of milk, increase to 3 grains if necessary.

It is even better to add to the dilute milk a small quantity of Citrate and about *double the quantity of Sodium Bicarbonate,*—this not only splits off some of the fixed lime, but renders the free lime more insoluble.—Sir James Barr, B.M.J. i./11,1361.

WASTING OF INFANTS FED ON UNDILUTED CITRATED MILK. Sir A. E. Wright showed that Sodium Citrate will entirely prevent coagulation of milk, but that the softness and fineness of the curd varies directly with amount used, —the method can be employed to render the curd more soft and flocculent like that of human milk. Cow's milk, provided by nature for the growing calf, an animal possessing a large quantity of growing bone, contains 0·17% Calcium Salts. Human milk, on the other hand (the progeny in this instance, has relatively slow bone formation), contains only 0·03% Lime Salts. The Citrate is thought to influence the clotting of milk by precipitating the bulk of the Lime Salts. Some claim however, that the Citrate redissolves the precipitated Salts. **For Hospital Patients** prescribe 2 grains to each ounce of milk (first brought to the boil). If 4 ounces of milk are given every 3 hours 8 *grains in* 1 *drachm of water* may be ordered (others advise 1 grain only to each ounce).

In eczema and other 'lithaemic' conditions large doses of this Citrate valuable. Migraine and inveterate neuralgia in gouty adults well treated. The unsatisfactory development of infants fed with cow's milk is viewed to be caused by chronic alimentary poisoning by phosphoric acid. The urine of such contains more phosphoric acid than breast-fed and has a correspondingly higher acidity.—B.M.J. ii./11,493.

In mitral stenosis decalcification of the blood in the system is advised.—B.M.J. ii./08,1789.

Anæmic patients (from menorrhagia due to fibroids) who undergo hysterectomy should have 20 grain doses twice daily to diminish tendency of the blood to coagulate in the vessels. Should certainly be given if the least tendency towards thrombosis.—B.M.J. ii./08,13.

Scurvy in the adult and in the infant is associated with a diminished alkalinity of the blood. Sodium Citrate increases the alkalinity, and symptoms of scurvy disappear rapidly. Lime Juice contains 0·3% Sodium Citrate. Sir A. E. Wright, L. ii./08,725.

A chronic callous ulcer of the leg can be softened in a week by applying Solution of Salt and Sodium Citrate from time to time to encourage flow of lymph. This can be checked if necessary by rubbing into the part a mixture of 1 of Calcium Chloride to 399 Precipitated Chalk.—L. ii./08,731.

Dyspepsia treated by Sodium Citrate in average dose of 30 to 60 grains taken divided when pain sets in.—L. i./07,309; M.A., 1908,14.

In Bright's disease many patients do well on a pure milk diet (2½ to 3 pints slightly diluted) and Sodium Citrate added with advantage, but several difficulties arise in use of milk for nephritis.—*vide* Pr., Aug. 09/157.

Gaucoma treated by subconjunctival injection of solution 4·05 to 5·41% strength.—L. i./12,226.

In pneumonia 30 to 40 grains every two hours it is stated will cause immediate and rapid lysis.—Pres., Jan. 13, 16.

Venous thrombosis as occurring in enteric treated by intravenous injections (up to ½ pint) of 0·5% Sodium citrate—good results.—H. F. Marris, B.M.J. ii/17,822.

Wright's Solution.—Sodium Chloride 4, Sodium Citrate 1, Water 120 For sinus washing.—Pye's Surg. Handicraft.

Liquor Sodii Ethylatis (B.P., 1898).

Is prepared by dissolving Sodium 1, in Absolute Alcohol 20, keeping the latter cool by a stream of cold water; has Sp. Gr. 0·867, and contains 18% of C_2H_5ONa. Rapidly becomes brown.

Uses.—Effective caustic for nævi and moles and lupus; also in hypertrichosis. Applied with a glass rod for 2 or 3 successive days.

No water should be allowed to touch the part.

Sodii Hydroxidum. Soda Caustica. NaOH=40·008.

Dose.—½ to 1 grain (0·03 to 0·06 Gm.) well diluted.

In coarse white powder, fused masses, or moulded sticks.

Sodium Hydrate transfused through the heart increases the tonicity and frequency.—B.M.J. ii./06,1128.

Sodii Iodidum. NaI=149·92.

Dose.—5 to 20 grains (0·3 to 1·2 Gm.).

A white crystalline deliquescent powder, *soluble* 3 in 2 of water and 1 in 3 of alcohol 90%. Must be distinguished from the hydrous salt containing $2H_2O$, which crystallises from cold solutions.

Flavoring.—Glyl Amygdalæ Amaræ, Syl Cinnamomi.

Uses similar to those of the potassium salt *q.v.*

Actinomycosis treated.—L. ii./04,1204,1225.

In aneurism Sodium Iodide is useful.—Tirard, Med. Treatment.

Mediastinal growths. Sodium Iodide 2 or 3 grains with 5 to 7 grains of Chloral every 3, 4 or 6 hours relieves the dyspnœa. The Iodide may have some effect in causing absorption,—not of the tumour, but of the adventitious materials about it, while the Chloral acts as sedative and antispasmodic.—Pr., May, 1911, p. 605.

In the routine treatment of chronic rheumatism, full doses of Sodium Iodide with Guaiacum give, perhaps, best results.—Whitla, Pract. Med.

Mistura Sodii Iodidi Composita.

Dose.—1 drachm (4 Cc.) thrice daily for an adult.

Sodium Iodide ½ drachm, Sodium Benzoate 3 drachms, Arsenical Solution ½ drachm, Tincture of Pulsatilla 1 drachm, Tincture of Baptisia 3 drachms, Syrup of Orange 1 ounce, Chloroform Water to 8 ounces.

In tuberculosis of every variety J. Laird has found this mixture of great service. Calcium Salts in large quantities also essential, and in surgical cases lint moistened with a solution of Tincture of Iodine and covered with oil-silk to be applied.—'Notes on the Treatment of Tuberculosis: Preventive and Curative.'

Sodii Nitras. $NaNO_3$=85·01. *Dose.*—5 to 15 grains (0·3 to 1 Gm.). Saline, refrigerant, diuretic.

Sodii Nitris, $NaNO_2$=69·01.

Dose.—1 to 2 grains (0·06 to 0·12 Gm.).

Is obtained by reduction of Sodium Nitrate by fusing it with lead.

In white, deliquescent, crystalline granules, or in sticks, with a cooling saline taste, soluble 2 in 3 of water; useful in angina pectoris and in epileptiform convulsions,—action similar to nitrite of amyl.

Compressed Tablets 2½ grains each, are prepared.

For asthma 3 to 5 grains frequently repeated; specially useful with hyoscyamus.—L. i./90,240.

"Sterules," Hypodermic, 1 Cc. containing ⅙ grain (**0·01 Gm.**). ⅓ grain (**0·02 Gm.**), and ¾ grain (**0·05 Gm.**) are prepared.

Even ⅛ grain distinctly affects the circulation, yet large doses do not cause death.—D. J. Leach.

The modern treatment of high tension by nitrites had been recommended in the time of Queen Elizabeth—nitre and blood-letting were advocated to prolong life—the nitre contained nitrites.—M.P., Apl. 24/07,456.

In granular kidney valuable. High tension of the pulse is natural to the disease. For urgent symptoms.—L. ii./08,519.

Raised arterial tension when dangerous, well treated by ½ grain doses, gradually increased to 4 or 5 grains.—Brunton, L. ii./08,1132.

See also **Pulvis Potassii Nitritis Compositus** and **Pulvis Sodii Nitritis Compositus.**

Tablets of Sodium Nitrite ½ grain, with **Sodium Iodide** 3 grains, also prepared 1 grain with 5 grains. To ward off attacks of asthma 1 every 2 or 3 hours. In attacks of paroxysmal pain, in aortic insufficiency Sodium Nitrite 2 grains with Sodium Iodide 3 grains thrice daily afford great temporary relief.—Yeo.

Tabellæ Sodii Nitritis Compositæ (*G. Oliver*).

Dose.—One or more as required.

Sodium Nitrite ½ grain, Erythrol Nitrate ⅛ grain, Mannitol Nitrate ¼ grain, Ammonium Hippurate 1 grain.

A combination of the slowly acting vasodilators of some promise.—G. Oliver, Studies in Blood-Pressure.

Poisoning of an infant by taking 3½ grains Sodium Nitrite misread for Sodium Citrate, L. ii./17,162.

Sodii Phosphis.—$Na_2HPO_3+5H_2O=216{\cdot}128$, white crystalline powder soluble in water.

Sodii Phosphas Neutralis. *Syn.* TRIBASIC SODIUM PHOSPHATE. $Na_3PO_4+12H_2O=380{\cdot}232$.

Used for softening water and for boilers, preventing incrustation.

Soluble in water with alkaline reaction, by dissociation of Sodium Hydrate.

Sodii Phosphas. *Syn.* HYDROGEN DI-SODIC PHOSPHATE; TASTELESS PURGING SALT. $Na_2HPO_4,\ 12H_2O=358{\cdot}24$.

Dose.—¼ to ½ ounce (**8 to 15 Gm.**) or 30 to 120 grains (**2 to 8 Gm.**) repeated. Colourless crystals or white granules.

Soluble 1 in 7 of water, is very efflorescent, loses 63% of its weight when heated to dull redness. Has an alkaline reaction.

Flavoring.—It is practically tasteless.

A mild aperient, well suited for a delicate stomach; small doses antacid and diuretic, useful in bilious sick-headache and jaundice.

For hepatic calculi, 60 grains 3 times a day, with 1/20 grain sodium arsenate added, is given if any evidences of gastric intestinal catarrh.

Fireproofing.—Fairly concentrated solutions of sodium phosphate, ammonium phosphate, sal ammoniac, or sodium tungstate (20%) are all useful.

Sodii Phosphas Effervescens. (**Martindale**).

Dose.—1 to 3 drachms (**4 to 12 Gm.**).

A convenient and pleasant mode of taking this useful purgative. Introduced by W. Martindale, and now made Official.

In exophthalmic goitre and neurasthenia of value.—M.P. ii./07,73.

As nervine tonic in stomach dilatation—must be persevered with

'Vescettes' of Sodium Phosphate. 30 grains.

Dose.—1 to 6 crushed and taken in a draught of warm water.

Sodii Phosphas Exsiccatus. Contains not less than 99%. $Na_2HPO_4=142{\cdot}048$.

Dose.—10 grains to 4 drachms in some warm liquid.

Sodii et Ammonii Phosphas. *Syn.* MICROCOSMIC SALT. $Na(NH_4)\ HPO_4+4H_2O = 209{\cdot}154$. Used in chemical analysis with blowpipe.

Sodii Phosphas Acidus (*Off*). **Dihydrogen Sodium Phosphate** $NaH_2PO_4+H_2O=138{\cdot}072$.

Dose.—30 to 60 grains (**2 to 4 Gm.**).

Crystals soluble about 1 in 1 of water, and 1 in 300 of alcohol 90%. The *Off.* Salt is 70% pure. Has been given in alkalinity of urine with good results. Particularly useful in cystitis, and after operations on the bladder to keep the urine acid. If diarrhœa occurs, stop its use for a time.

Passage of a calcium oxalate stone may be assisted by employing this salt owing to its solvent action on calcium oxalate. The salt given by the mouth is eliminated as such. Two ounces per diem in 100 ounces of distilled water were administered, and in six weeks no symptoms of stone remained, yet no calculus was passed—the stone was dissolved. The solvent action can be demonstrated *in vitro.* The same treatment is advised in cases of Calcium Oxalate deposit without stone formation,—should be given from time to time to prevent concretion.—B.M.J. ii./09,1347.—P.R.S.M.Med. Sect., 1909, p. 1 *et seq.*

Given by the mouth will convert an alkaline urine into an acid one or increase acidity if already so. Acidity excepting in case of *B. Coli*, and *Staphyococcus* means lessened bacterial growth.—P.J. ii./11,16.

Sodii Sesquiphosphas.

$Na_3H_3P_2O_8=262{\cdot}104$.

Average dose.—30 grains (**2 Gm.**) *pro die* in divided doses.

This salt may be considered as a combination of equimolecular proportions of the Ortho-phosphates,—Na_2HPO_4 and NaH_2PO_4.

Manufacture.—By neutralising 426 Gm. of Exsiccated Sodium Phosphate with Phosphoric Acid Sp. Gr. 1·75 (about 110 Gm.) in presence of sufficient water, concentrating and allowing to crystallise, finally exsiccating at a moderate temperature. It is virtually neutral to both blue and red litmus. It distinguishes itself as an Ortho-phosphate Compound by not coagulating Albumin, and by yielding a yellow precipitate with Silver Nitrate Solution. ***Soluble*** with ease in water. It is not so hygroscopic as Sodium Acid Phosphate.

Joulie employs this salt where the 'Ratio of Phosphoric Acid' is deficient and the 'Ratio of Acidity' is normal. It is not at all objectionable to the taste.

Hyper-acidity will rapidly yield to the ordinary Sodium Phosphate, *e.g.*, in the form of Effervescent Sodium Phosphate, *q.v.* *For a full consideration of this method, vide Vol. II.*, *v. also* L. ii./06,1382.

Sodium Silicate, Solution of. *Syn.* SOLUBLE GLASS, Water Glass. $Na_2SiO_3=122{\cdot}30\ (+Aq.)$

A viscid solution, of the consistency of treacle, usually containing

10% of caustic soda and 20% of silica. The solution will arrest the putrefaction of organic matter.

In powder form this silicate is used medicinally in France, but both it and Silica *vide infra* would appear to be unsuitable chemicals for use *per os*.

Liquor Natrii Silicici. P.G.V.

Contains about 35% of a variable mixture of Sodium trisilicate and Sodium Tetra silicate, Sp. Gr. 1·3 to 1·4.

Silica (Silicic Acid). Pills containing 1 grain with Morphine ⅓ grain also lozenges containing 1 grain with Sugar basis in cancer.—Battye. Edin. Med. Jl., 1874,420; Pres., 1912,298.

Potassium Silicate, Solution of. Variable amounts of K_2SiO_3=154·50 and SiO_2=60·3. *Syn.* SOLUBLE GLASS.

Is less viscid than the last and is also used to impregnate bandages for treating fractures. This was the original preparation of the two.

Salufer. A mixture of Silicofluorides used in the moist treatment of wounds. There is no fear of absorption.—B.M.J. i./03,712.

Sodii Persulphas, Sodium Persulphate.

$Na_2S_2O_8$=238·12.

Dose.—1 to 3 grains in water before meals.

In small white granular crystals, soluble in water. In tuberculosis and chlorotic and neuropathic subjects stimulates appetite. Useful in hyper-acid dyspepsia at the onset, also in gastric cancer. A strong oxidising and bleaching agent.

Liberates about 13% active oxygen. If it is desired to avoid production of free sulphuric acid, the persulphate may be mixed with 1¼ times its weight of Sodium Carbonate. 3 to 10% solutions as gargle and dressing. Suitable for wounds requiring moist dressing and where disinfection necessary. For small ulcers may be used as dusting powder, with equal quantity of powdered talc. Odourless and non-toxic.—L. ii./08,1619.

Tetanus treated by intravenous injection of fresh 5% Sodium Persulphate solution given—60 Cc. each day—preferably in 2 or more doses injected slowly, the injection taking some 5 minutes. A reaction often appears—nausea and vomiting for ½ hour. Three cases with good effect.—L. i./18,188.

For details of other Persulphates (Ammonium and Potassium) see Vol. II.

Sodii Sulphas Acidus. $NaHSO_4+H_2O$=138·084. *Syn.* SODIUM BISULPHATE.

In crystals or in fused masses, is recommended to purify water which may have typhoid contamination; 15 grains to a pint of water destroys *B. typhosus* after 15 minutes contact, as also *B. enteritidis*, *Spirillum choleræ* and internal parasitic worms.

This fact was originally determined by S. Rideal and a patent was taken out by him for the process. We ourselves have frequently verified the activity of a solution of this kind on water infected with *B. typhosus*. For a further confirmation see J. S. White, C.D. July 31/15, p. 179; and Historicus, C.D. Aug. 21/15, p. 292.

'Anti-Typhoid' Tablets (originally patented by S. Rideal), containing the equivalent of 7½ grains of active Sodium Bisulphate are prepared, to dissolve in ½ pint of water.

They are effervescent and yield a slightly acid, refreshing and thirst-quenching drink. They should also be used for washing food, *e.g.*, Salads. They were employed in the South African and in the Russo-Japanese wars with success. Used by the Territorials, in forced marches not exceeding 3 days useful. After a few days' use it acts as a purge.—L. ii./09,418.

Nauheim Bath Salts are prepared with this Salt and Sodium

Bicarbonate. The Nauheim Water contains in addition Sodium and Calcium Chlorides, *c.f.* List of Mineral Waters.

Fused Sodium Bisulphate Tablets, 5 ounces and packets of Sodium Bicarbonate for making **Effervescing baths** patented by E. Sandow. Patent now expired.

In hydropathic establishments according to Ph. Form. baths are prepared extemporaneously with the following (each quantity for 40 gallons at 95° F.):

No.	Sodium Chloride.	Calcium Chloride.	Sodium Bicarbonate.	Hydrochloric Acid.
1	4 lbs.	6 ozs.	None.	None.
2	5 ,,	8 ,,	None.	None.
3	6 ,,	10 ,,	6 ,,	7 ozs.
4	7 ,,	10 ,,	8 ,,	9¼ ,,
5	9 ,,	11 ,,	1 lb.	18½ ,,
6	11 ,,	12 ,,	1½ ,,	27¾ ,,

Effervescing baths are believed by many to have a more marked effect in lowering blood pressure than ordinary water at similar temperature.—L. i./13,1467.

Sodii Sulphas. $Na_2SO_4.10H_2O = 322·22$.

Dose.—¼ to ½ ounce, or 30 to 120 grains repeated.

Transparent efflorescent crystals with bitter taste, soluble about 1 in 3 of water—also in Glycerin; insoluble in Alcohol.

The form in commerce known as '**Feathery Crystals**' is handy for dispensing.

Flavoring.—Glyl Vanillæ, Glyl Menthæ Piperitæ.

Experiments in infantile diarrhœa showed that Sodium Sulphate is apparently strongly antiseptic—as the diarrhœa disappears. The dose was insufficient to be aperient. About 6 grains initially for a baby under 6 months, increasing up to 1 drachm for adults every 6 hours in fennel water. Children over 6 months can take 10 to 20 grains without producing aperient action.—L. ii./06,1281.

Sodii Sulphas Exsiccatus. $Na_2SO_4.H_2O = 160·076$.

Dose.—½ to 2 drachms (**2 to 8 Gm.**).

On drying, Sodium Sulphate (Glauber's salt) loses about one-half its weight, leaving the almost anhydrous salt.

Sodii Sulphas Effervescens.—*Martindale.*

Dose.—A teaspoonful or more in half a tumbler of water, taken half an hour before breakfast; it produces as a rule *one* efficient evacuation.

Sodii Magnesii Sulphas Effervescens,—*Martindale.*

Dose.—A teaspoonful or more in half a tumbler of water taken half an hour before breakfast.

This and the above are agreeable and efficient aperients introduced by the writer. They are palatable, stable in composition, and convenient to use when travelling.

'**Vescettes**' **of Sodio-Magesium Sulphate.** Each equivalent to 60 grains of the above, to be dissolved in a little warm water.

Sodium and Magnesium Sulphates are useful in clearing out the intestinal tract and lower the blood-pressure (in arteriosclerosis).

Sodii-Magnesii Sulphas Effervescens cum Caffeina.—*Martindale.*

Dose.—One teaspoonful or more.

A useful "pick-me-up," and for headaches.

'**Vescettes**' of this preparation contain 60 grains.

Chloro-Sodio-Magnesian Aperient.—*Martindale.*

Dose.—A teaspoonful or more.

An efficient saline purge, useful in migraine and other forms of headache; also in constipation, and for assisting digestion and relieving depression by increasing the action of the liver, intestines, and kidneys, and promoting free excretion of waste products.

The activity and palatability of the last five preparations may be increased, especially in winter, if taken in *warm water.* The combination of the salts of sodium and magnesium makes a more active purgative, but the effervescent sodium sulphate alone is more pleasant.

Sal Carolinum Factitium, P.G.V., Ph. Ned., Artificial Carlsbad Salt. *Dose.*—20 to 60 grains (**1·3 to 4 Gm.**) in warm water. Dried Sodium Sulphate 22, Potassium Sulphate 1; Sodium Chloride 9, Sodium Bicarbonate 18, all in fine powder. Mix. 53 grains to 1 pint of water is similar to Carlsbad Water.

Marienbad Salt is similar. **Marienbad Salt Tablets** may be prepared containing 60 grains of the mixture.

Marienbad Antiobesity Tablets. *Dose.*—One or two at bedtime. Aloes ½ grain, Rhubarb 1 grain, Cascara Extract ½ grain, Marienbad Salt ½ grain Fucus Extract 1/6th grain.—P. J. F.

Note.—T.M.s ✱ 'Marienbader' No. 154288 and 154289 also 'Marienbader Tabletten' No. 242596 are on the Register.

'**Vescettes**' of Carlsbad Salts. Each equivalent to 2 ounces of Carlsbad-Sprudel Water.

Cavendish Water (*Martindale*).

Dose.—A wineglassful, diluted if preferred with a little warm water, ½ hour before breakfast.

Contains Sodium, Magnesium and Potassium Sulphates, also Sodium and Potassium Chlorides in a slightly effervescent Solution.

Aqua Dissocians.

Dose.—¼ of a glassful—diluted preferably with distilled water to a glassful —in the morning.

This water is not purgative. It depends for its action upon the property of chemical dissociation of the contained salts which include the Chlorides of Sodium, Potassium, Magnesium and Lithium, together with Sulphates of Magnesium and Calcium and a minute quantity of Sodium Bromide. It is slightly chalybeate and resembles chemically many mineral waters.

Sal Emsanum Facticium, Ph. Ned.

Sodium Sulphate Exsiccated 7, Potassium Sulphate 13, Sodium Chloride 325, Sodium Bicarbonate 655. **Sal Hunyadi Janos Facticium, Ph. Ned.** Desiccate Magnesium Sulphate 950 to 500, add Sodium Chloride 50, and Sodium Sulphate Exsiccated 450. **Sal Vichy Facticium, Ph. Ned.** Desiccate Sodium Phosphate 40 to 16, add Potassium Sulphate 50, Sodium Chloride 80, Sodium Bicarbonate 854.

Dose of each.—20 to 60 grains (**1·3 to 4 Gm.**), increased as required.

Sodii Sulphis. $Na_2SO_3,7H_2O=252{\cdot}172$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Colourless efflorescent crystals (keep in stoppered bottles).

Soluble in water, *Off.* states 1 in 2, we find 1 in 2·1 by experiment, also in Glycerin 1 in 25; slightly in Alcohol 90%. Incompatible with acids. Antiseptic.

In dilatation of the stomach the late Sir Wm. Broadbent recommended as antiseptic treatment Sodium Sulphite 5 to 10 grain doses, with sodium bicarbonate and nux vomica between meals.

As a lotion for skin affections and sores of the mouth, and internally for *sarcinae* in the stomach.

Sodii Sulphis Exsiccatus contains about 90% Na_2SO_3=126·06. Is used in photography. Being in dry powder is convenient for transit.

Sodii Bisulphis. $NaHSO_3$=104·068.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

White powder soluble 1 in 4 of water. Incompatible with acids. Has antiseptic properties. In stomatitis and skin affections.

Sodii Metabisulphis. *Syn.* SODIUM PYROSULPHITE. $Na_2SO_3SO_2$ =190·12. Made by passing Sulphur Dioxide into a hot concentrated aqueous solution of Sodium Sulphite.

Suggested Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Sodium Metabisulphite 20 grains, Alcohol 90% 1 ounce, Peppermint Oil 5 minims, Glycerin 2 ounces. Has been used as an antiseptic throat pigment. It is said to be a specific to kill yeast fungus in the intestines. In photographic use is similar to the Potash Salt, *q.v.*

Sodii Sulphidum, $Na_2S,9H_2O$=240·204. Yellowish deliquescent crystals soluble in water. Employed in skin affections.

A 25 to 40% Aqueous Solution as depilatory.—B.M.J. ii./o6,1779

In surgery a mixture of this, cold-water, starch and fine unslaked lime is used as a depilatory.—A. Don, L. ii./15,339.

Balneum Sulphuris Alkalinum (see also p. 730).

Sodium Sulphide 2 ounces, Sodium Chloride 2 ounces, Sodium Bicarbonate 1 ounce. To be added to 50 or 60 gallons of hot water.

Soda Tartarata. **Sodii et Potassii Tartras.** (*Off.*). ROCHELLE SALT, SEIGNETTE SALT. $(CHOH)_2.COONa.COOK + 4H_2O$= 282·216.

Dose.—120 to 240 grains (**8 to 15 Gm.**). Colourless crystals.

Soluble 1 in 1½ of water (by experiment.—W. H. M.)

Also in Alcohol 20% (Wt.) at 25° C. 1 in 2·82, 50% 1 in 40·7, 70% 1 in 332·4, 80% 1 in 1665, 100% 1 in ∞.—Seidell.

Flavoring.—Syl Lavandulæ, Syl Rosæ; Syrupus Aurantii.

Pulvis Sodæ Tartaratæ Effervescens (*Off.*)
Seidlitz Powder.

Sodium Potassium Tartrate, in dry powder, 120 grains. Sodium Bicarbonate, in dry powder, 40 grains, in the blue paper. Tartaric Acid, in dry powder, 40 grains, in the white paper. *Off.* now states approx. these figures in metric terms. 'EXTRA STRONG' (3 drachms Rochelle Salt) and '**Double Strength**' (4 drachms) are also supplied.

Seidlitz-powder in Italy is composed of magnesium sulphate 15, sodium bicarbonate 2, tartaric acid 2.—Ph. Notes.

Sodii Tartras (Neutrale). $(CHOH.COONa)_2\ 2H_2O$=230·084.

Dose.—As aperient ½ to 1 ounce. Diuretic, 15 to 60 grains repeated. White crystalline powder comparatively tasteless. Soluble in water 1 in 2 by our experiment, 1914. Relaxes the bowels and increases the flow of urine.

Sodii Sulphocyanidum. *Syn.* SODIUM RHODANIDE, SODIUM THIOCYANATE. C ⋮ N.S.Na=81·075.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

A crystalline colourless salt, soluble in water 1 in 0·3, and 1 in 0·6 of Alcohol 90%. It has a sedative action on the nervous system, is an analgesic and may be found useful in nervous affections, aterial sclerosis, and chronic nephritis Favourable effect on pains of tabetics and in angiospastic migraine.—B.M.J.E. i./13,52.

Sodium, potassium and ammonium thiocyanates were tested on rabbits and other animals. No hydrocyanic acid was split off, and these salts did not act as poisons.—J.C.S.A. ii./12,668.

Sodii Taurocholas, $NaC_{26}H_{44}NSO_7=537{\cdot}552$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**), in pill, keratin-coated to prevent solution until it reaches the bowels. A whitish powder, prepared from pig's bile, *soluble* about 2 in 1 of water. It has been recommended for gouty obesity and dyspepsia. Is added to culture media for separation of *B. Typhi abdom.* from *B. coli communis.*—B.M.J. i./02,1473.

Sodii Glycocholas. $NaC_{26}H_{42}NO_6=487{\cdot}476$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

A similar salt, soluble 1 in 2 of water and 1 in 3 of alcohol 90%, which appears to be a useful cholagogue for congestion of the liver, gallstones, constipation and melancholia.

These salts produce slight fall of blood pressure, the taurocholate more than the glycocholate.—B.M.J. i./05,59.

Bile salts have a deterrent effect upon the growth of gonococci *in vitro.* They have been used locally to the conjunctiva.—Annus Medicus, L. ii./09,1895.

Cholalic Acid. *Syn.* ✱Colalin. (T.M. 271422); Cholic Acid. $C_{24}H_{40}O_5=408{\cdot}42$.

An active principle of bile in amorphous yellowish powder, non-toxic and non-irritating.

Soluble in alkalis, particularly caustic potash, and in alcohol about 1 in 1; insoluble in acids, ether, and water.

Colalin Tablets (⅛ and ½ grain in each. *Dose.*—One three times daily before food) also contain a little magnesium carbonate.

Uses.—Stimulate the liver and increase flow of bile. Has slight depressant action on heart. Soluble in the alkaline juice of the small intestine—not dissolved in the stomach. For biliousness, melancholia, recurrent sick-headache and intestinal indigestion.

Should the substance constipate due to the action the bile has on absorption of fats, **Colalin Laxative** should be administered. Colalin combined with the principles of Cascara. **Tablets** contain 1⅛ grain each. In this proportion, *viz.*, Colalin ¼ grain, Anthraquinone of Cascara ⅞ grain. *Dose.*—One thrice daily.

Desoxycholic Acid.

According to Schmidt has the formula $C_{24}H_{40}O_4$; obtained by reducing Cholic Acid (*Syn.* Cholalic Acid), $C_{24}H_{40}O_5$ with Zinc and Acetic Acid.

W. Mair (Report from Research Laboratory Metropolitan Asylums Board, London), Biochemical Journal, Vol. XI., No. 1, May, 1917, digests Ox Bile with Soda and throws out the Bile Acids with Acetic Acid (after first freeing from Silica by a sufficiency of Hydrochloric Acid). The Bile Acids are recrystallised from Glacial Acetic Acid repeatedly, using also 60% Acetic Acid in the later stages. The method gets rid of Cholic Acid and other impurities yielding the Desoxycholic Acid practically pure with melting point 172° to 173° C.

4 litres of bile yield from 30 to 40 Gm. The acid can also be made from Commercial Sodium Taurocholate on similar lines—the yield being about 5%.

Sodium Desoxycholate.

Spray Solution.—Sodium Desoxycholate 4, Quinine Hydrochloride 0·5, Glycerin 25, Water to 100. For septic throats.

Tablets.—Contain Sodium Desoxycholate 1 grain, Quinine Ethyl Carbonate 1/8th grain, Peppermint Oil 1/20th minim, Ammoniated Glycyrrhizin 2 grains. Also made with Flavine 1 in 1,000. For infected throats.

Bile salts appear to possess a solvent action on pneumococci, also on amœbæ and spirochætes. Sodium Desoxycholate was found to be 10 times more powerful than Sodium Cholate or Sodium Taurocholate. The addition of quinine enhances the action.—F. M. Wells, B.M.J. ii./17,6.

P1 SPARTEINÆ SULPHAS.

$C_{15}H_{26}N_2.H_2SO_4.5H_2O$ = 422·459 (water content varies). Fr. Cx. and **P. Jap.**

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**) increased.

Fr. Cx.—*Max. single dose* ¾ grain, max. during 24 hours 4 grains.

The sulphate of a volatile liquid alkaloid $C_{15}H_{26}N_2$=234·303 in colourless crystals. *Soluble* 3 in 2 of water, and about 1 in 6 of alcohol 90%. Obtained from the leaves and branches of Broom, *Cytisus scoparius.* This contains also a crystalline principle Scoparin.

Two new alkaloids found, one volatile like Sparteine, the other not.—A. Valeur, Compt. Rend. 1918, 167, 26, 162, Y.B.P. 1919, p. 10.

Ⓟ**Hypodermic Tablets** contain ½ grain (**0·03 Gm.**).

Ⓟ**Pills** contain ¼ grain (**0·016 Gm.**).

Properties and Uses.—Sparteine possesses no digitalis action; it acts like conine, atropine, curarine and cocaine, but feebly. In its resemblance to conine it acts on the central nervous system. Like atropine in paralyses the vagus nerve, but only in very large doses, and in these it paralyses the motor nerve endings so that in this respect it resembles curarine. It perhaps also paralyses the sensory nerves—when injected it anæsthetises like cocaine. —Gordon Sharp, P.J. i./16,348.

In spite of pharmacologists' opinions, it has been used when digitalis fails, and has recently been much used in the war.

The only cases in which it is unsuitable in ordinary dose (⅓ to ½ grain) is where high tension exists due to excess in smoking.

Dr. Samuel Johnson passed 20 pints of urine in 24 hours after taking the infusion.—B.M.J. ii./09,537.

In the past it has been given in morphine habit.

In post-operative suppression of urine.—L.i./07,960. *Large doses.* —1 to 2 grains hypodermically every 3 to 6 hours.—M.A. 1908,33.

P1 **Oxysparteina,** $C_{15}H_{24}N_2O$=248·287 is an oxidation product of Sparteine.

Has been stated also to act as a cardiac stimulant. The **Hydrochloride** and **Sulphate** are prepared.

Scoparin $C_{20}H_{20}O_{10}$, a neutral soluble phenol principle allied to the glucosides. *Dose.*—½ to 1 grain (**0·03 to 0·06 Gm.**). This other constituent of broom acts as a true diuretic on the kidney tissue proper, and it also acts as a diuretic in virtue of its digitalis-like action on the heart muscle.

Broom had its day before Digitalis. The amount of digitalis like action is relatively small.—Gordon Sharp, P.J. i./16,347.

SPHAGNUM.

TURF MOSS or BOG MOSS.

Botanical.—There are numerous varieties of Sphagnum indigenous to Great Britain. Large tracts of it are found in Scotland, the English lakes, Dartmoor and in Ireland.

We are indebted to Mr. Holmes for the following notes on a mixture of Sphagnum sent to him for botanical diagnosis :—

> The large concave leaved plant is *Sphagnum Cymbifolium*. *S. Papillosum* is only distinguishable under the microscope from it. *S. Cuspidatum* has long tapering branches and narrow tapering leaves and grows *in* water. *S. Acutifolium* is small, usually in compact tufts with small leaves of various tints. The other common species are mostly intermediate in character; *S. Contortum* like a small *Cymbifolium* with curved rather stiff branches, *S. Reflexum* with flat edged leaves and *S. Squarrosum* with leaves bent back.

The plant consists virtually of a large collection of delicate resilient capillary tubes or perforated cells having the effect of a very fine sponge. These cells readily take in water and hold it firmly—the water can be squeezed out without the cells collapsing—(this is the case even after the application of hydraulic pressure—W. H. M.). In life the plant takes all its water from the atmosphere—it is not dependent on soil water.—Prof. I. Bayley Balfour, quoted by C. W. Cathcart, B.M.J. ii./15,137.

Chemical Examination.—An analysis by E. Treffner in 1881 of *S. Cuspidatum* showed it to contain 7·3% of substances soluble in water. Glucose is present to the extent of 3·05%, Saccharose 1·2% (—? W. H. M.), Chlorophyll 0·9%, Resin 0·7%, Albuminoid soluble in water 1·4%, Tannin and Mucilage traces, and Ash 1·9%. No evidence of Iodine.—P.J. i./16,125.

Uses.—For some years past the writer has advocated the use of dried sphagnum as *the* absorbent dressing *par excellence* for imbibing discharge of any description.

It has no doubt been used for centuries by soldiers to staunch wounds in war—it was used by the Highlanders on Flodden Field, and it is stated (A. McCutcheon, P.J. ii./16,587) was employed in Ireland, 1014, for this purpose.

It was also brought into service by blast furnace workers as a protective against heat and as a dressing for burns.

The plant in its dry condition will imbibe a large quantity of water or discharge—upwards of 20 times its weight. The variety *Cymbifolium* is thought to be the most efficacious in this direction, but there is probably not much difference between one variety and another.

Not only for suppurating wounds in war, but for taking up urinary discharge in bladder, kidney and dropsical affections is the material pre-eminently suitable. The dressing is also useful as a bedding for insane persons.

For some early "Experiences with Moss as a Surgical Dressing," *vide* H. A. Lediard, Surgeon to the Cumberland Infirmary, B.M.J. ii./87,829. See also a paper by Colin G. Campbell and E. Chamberlayne, Manch. Med. Soc., 1891. Colin Campbell was an ardent user of moss. He pointed out that :

> When cotton wool is placed in contact with a liquid, the fluid seems at once to seize it, its bulk becomes *diminished*, and its surface wet, each fibre having become saturated with the moisture. Moss, on the other hand, seizes

the liquid; its bulk becomes rapidly and enormously *increased*. The absorbed liquid does not lie on the surface or between the fibres, but is shut up within the capillary cells of the moss: Thus, though it is full of liquid, *it does not feel wet*, and though it may be full of pus, it appears clean.

One of the advantages of moss as an absorbent is that the discharge when absorbed by it *spreads—diffuses quickly in all directions* until the moss is all soaked, rendering it therefore more efficient as a dressing. Cotton wool has not this action—the absorption is relatively local—upwards from the discharging surface. Patients state that the dressing is cool while cotton dressings are not.

Not only are the moss dressings cheap, but they are also deodorant and antiputrescent; hence they are invaluable as applications to foul ulcers or septic abscesses.

Material of this description would naturally contain types of non-pathogenic organisms—moulds for the most part. Some form of sterilisation will therefore be requisite, though we believe we are right in saying that a vast number of the moss dressings used in the war were not sterilised or treated with antiseptic in any way—and this in all probability without untoward infection of the wound.

Sterilisation of Sphagnum.—Mr. C. W. Cathcart has given the matter a good deal of attention. He states that steam sterilitation is not satisfactory. It hardens the walls of the capillaries of the plant and inhibits the absorbing power.

Sublimated Moss contains 0·25% Mercuric Chloride (the proportion commonly used for sublimating cotton wool). Sublimating the moss has been advocated by this surgeon. The preparation of this involves soaking the dry moss in a sufficiency of Mercuric Chloride solution, pressing out excess and leaving in it enough of the solution to yield the stated proportion of sublimate on drying again.—C. W. Cathcart, L. i./16.820. Anyone conversant with the extraordinary absorptive and retentive power of moisture exhibited by sphagnum knows the process is, to say the least of it laborious and expensive.

It is preferable to wring out the dressing in antiseptic lotion equivalent to a 1% Lysol just prior to use.

The writer has had considerable experience in the preparation of Moss Dressings both in the compressed form, and as muslin covered bags of convenient size for the use of the dresser—in this matter he lays claim to having started the industry in this country to compete with the German moss dressings :—

'Cavendish Moss.' Sheets compressed size 24 by 15 inches by $\frac{1}{8}$ inch approximately in thickness, two of which approximate 1 lb. in weight. These are handy for transit, a cwt. packing into a small case. For hospital use they are appreciated—the sheet is lightly broken up and teased out by the nurse and placed between folds of butter muslin or gauze. If desired the entire dressing so made is rung out in antiseptic lotion as already stated—in many cases it will be quite satisfactory to slip the compressed dressing under the bed sheet as it is.

'Hallam Moss.' This is similar to the latter, the sheets, however, being more friable and thinner.

Gauze Covered Moss in the same size and sheet is also prepared ready for use.

Moss (Loose) **Dressings** in muslin bags size 12 by 8 inches, 10 by 6 inches, and 7 by 5 inches.

Moss Towels for menstruation are made, also **Moss Accouchement Sheets** 36 by 36 inches, and **Pillows** 18 by 18 inches.

Moss dressings are especially suitable for wounds suppurating freely. In such wounds the best results will be obtained when the moss is applied damp. A thin layer of gauze is wrung out of a warm antiseptic lotion and laid on the wound; over this, and overlapping it freely, are placed the damp bags of moss as required. After each bag has been wrung out of the warm lotion, the contained moss must be lightly opened out with the fingers; this is done easily owing to the elasticity of the material. Lastly, the bags are held comfortably in position with a bandage. This treatment of the moss-bags is recommended whether the dressings are in the loose or compressed form, and whether they have been sublimated or sterilised by steam.—C. W. Cathcart, B.M.J. ii./15, 137; i./16, 893; i./17,752.

Sphagnum pads very useful, placed under wounds to collect excess of irrigant antiseptic in the Carrel-Dakin method.—B.M.J. ii./17,597.

* 'STERULES.'

(T.M. 260408)

'Sterules' are glass capsules of sterile solutions for inhalation, ophthalmic, hypodermic, intravenous, intramuscular, and ionic use. The **Ophthalmic Sterule** is inserted through an **Ejector**, and its 'breech' end is snapped off at the file mark. It is drawn further through the ejector, held horizontally, and the other end is broken off at the file mark. The 'breech' end of the ejector is now covered with the index finger, and the soft part is pressed with the thumb and second finger to release a small quantity (sufficient for one application in eye work) of a *sterile* solution. The file marks are situated ¼ inch from the ends of the 'sterule.'

For general purposes **Large 'Sterules'** are prepared containing 10 minims of solution, *e.g.*, cocaine hydrochloride 5 and 10%.—B.M.J. ii./02,980; B. & C.D. ii./02,77.

Hypodermic Sterules are as a rule flask-shaped. They contain solutions prepared for injection.

Sterules for Inhalation comprise sealed containers of chloroform 1, 2, and 4 ounce (30, 60 and 120 Cc. approx.), also Ether 1 and 2 ounces (30 and 60 Cc.), for the operating bag and for export to hot climates; and those of Amyl Nitrite; Ethyl Iodide and its combinations and similar compounds.

Syringe Sterule (Patent).—A combination of a sealed ampoule containing the customary medicaments, Cocaine, Morphine, Strychnine, etc., and hypodermic needle producing an effectual hypodermic syringe. As suggested by Capt. Nesfield, I.M.S.

Ionic Sterules are for use in Iontophoresis, *vide* Iontophoresis Vol. II.

For list of solutions in 'Sterule' form, *see* Index.

STRAMONIUM.

Dried leaves *Off*. and dried ripe seeds, B.P. '98, of *Datura Stramonium.* (*Solanaceæ*). U.S. requires not less than 0·25% stramonium alkaloids in the leaves when assayed as for belladonna.

Fr. Cx. has max. single dose, 4 grains, max. dose during 24 hours, 15 grains approximately. **Uses.**—Action similar to belladonna, and employed for the same purposes. Is a usual ingredient in cigarettes and the fumigating powders employed in asthma.

In Spanish the plant is *Yerba de huaco*, 'Plant of the Graves.' The thorn-apple being used in South America in form of a drink which gives hallucinations in the nature of communication with the spirits of ancestors.—P.J. ii./12,686.

P1 **Daturina.** *Dose.* $\frac{1}{120}$ to $\frac{1}{40}$ grain (**0·0005 to 0·0015 Gm.**) in solution with diluted sulphuric acid.

Datura Stramonium yields this alkaloid, which is identical with Hyoscyamine (*q.v.* for formula, and the alkaloidal salts).

Individual plants of *D. Stramonium* gave 0·47, 0·55, 0·52, and 0·46% Alkaloid and *D. Tatula*, 0·47, 0·63 and 0·65%, thus showing a marked variation.—Int. Cong., 1912.

D. Stramonium, Cultivation. The whole plant can be harvested with or without the root without fear of the total alkaloid content falling below 0·25%. —G. B. Koch, Am. Jl. Ph., January 1919. C.D. '19, 303.

Datura Metel Seeds from India contained 0·23% of total alkaloid consisting of Hyoscyamine and Scopolamine in proportion 2 : 1 together with a little Atropine. The capsules contained 0·1% of total alkaloid consisting of Scopolamine only.—P.J. ii./12,579, *see* also P.J. ii./05,230,617.

From the seeds of *Datura fastuosa var. Flor. coerul. plen.* which plant is said by many authorities to be identical with *D. alba*, Schmidt obtained Scopolamine 0·216%, Hyoscyamine 0·034%, and traces of Atropine. The var. *D. fastuosa flor. alb. plen.* gave slightly less of the constituents.—B. & C.D. ii./05, 210.

D. Alba, which grows wild in the Phillipines, as a source of Atropine and Hyoscyamine.—P.J. ii./16,297.

The leaves of *D. fastuosa v. alba* and *D. metel* as also seeds of the former are now *Off*. Tincture of Seeds 1 in 4, Alcohol 70%. *Dose.*—5 to 15 minims.

Stramonium seeds contain about 15–30% of a fixed drying oil. The seeds and leaves have about the same alkaloidal strength—average 0·22% —P.J. i./06,310.

Honey collected by bees from *D. Stramonium* has been wrongly stated to be toxic. Observation showed that the flowers in question are not visited by bees. They are pollenated by night-flying insects with long proboscides.—H. Deane, P.J. ii./13,134.

P1 **Extractum Stramonii** (B.P., 1898).

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

An extract of the seeds in No. 40 powder prepared with Alcohol 70%. U.S. Extracts (Pilular and Powdered) are assayed to 1% alkaloids. The average yield of extract from the leaves is 20%.—Caspari.

In spasmodic asthma the extract found better than the tincture. Sufficient should be given to be slightly toxic. Most patients show toxic effects on taking $\frac{3}{4}$ grain in 24 hours.—B.M.J i./09,788.

Ⓟ**Tinctura Stramonii** (*Off.* and B.P., 1898).

Dose.—5 to 15 minims, 1 of leaves to 5 of 45% alcohol by percolation.

Ⓟ**Mistura Antispasmodica, N.H.W.** Tincture of Stramonium, Tincture of Lobelia (Ethereal), Tincture of Opium, of each 6 minims, Chloroform Water to ½ ounce. Ⓟ**Mistura Asthmatica, N.H.W.** Tincture of Stramonium, Tincture of Lobelia (Ethereal) of each 10 minims, Ether 15 minims, Potassium Bromide 10 grains, Chloroform Water to ½ ounce.

STRONTIUM.

Sr=87·63.

Strontium is probably the most inoffensive of the alkaline earth-metals. Its salts are innocuous, improve the appetite, assist assimilation and nutrition, increase body weight, are not diuretic, and are said to be antiseptic to the digestive tract.

Strontii Bromidum (*Off.*), *Syn.* KORONIUM (CORONIUM) BROMIDE. $SrBr_2+6H_2O=355\cdot566$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

In deliquescent crystals, 97% pure *Off.*, with bitter saline taste, ***soluble*** in less than an equal quantity of water.

Flavoring. —Syl Lavandulæ, Syl Menthæ Piperitæ.

Used successfully in gastric affections, dyspepsia, and vomiting of nervous origin; also in epilepsy and chronic cardiac and renal diseases. In epilepsy bromide is the 'sheet anchor'—the strontium salt is best if tendency to acne be great. In ordinary attacks 15 to 20 grains thrice daily. To prevent depression (which is not so likely to arise if potassium bromide be avoided) add a little nux vomica If acne troublesome small doses of arsenic with the bromide.—L. i./09,908.

This salt may decolorise Compound Tincture of Cardamoms in a mixture. —P.J. i./14,670,698.

Tablets contain each 5 grains (**0·3 Gm.**).

Effervescent Strontium Bromide. *Dose.*—1 drachm (=10 grains).

'**Vescettes**' of **Strontium Bromide** contain 10 grains.

Strontii Bromidum Exsiccatum.

Dose.—4 to 24 grains (**0·25 to 1·5 Gm.**).

On drying Strontium Bromide it loses most of its water of crystallisation, 4 parts are about = 5 of crystals.

'**Coronium Bromide.**'—Methods of advertising through a 'clergyman.' Government analyst found in it 81% Strontium Bromide and 19% impurities and water.—Select Committee on Pat. Meds.—P.J. i./13,64.

Strontii Carbonas. $SrCO_3=147\cdot635$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

Strontii Iodidum. U.S. $SrI_2+6H_2O=449\cdot566$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

In white crystalline masses, freely soluble in water.

Exophthalmic goitre of children has been treated with this and the Bromide, also asthma, rheumatism, and chronic endocarditis.

Strontii Lactas, U.S. (1890). Fr. Cx

$(C_2H_4\ OH.COO)_2Sr+3H_2O=319{\cdot}788$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

A white crystalline powder, very soluble in water, of service in albuminuria and Bright's Disease. May be combined with iron in the albuminuria of pregnancy.

To increase coagulability of the blood 15 to 30 grain doses useful.

Strontii Salicylas, U.S. $[C_6H_4.OH.COC]_2Sr+2H_2O=397{\cdot}812$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A white crystalline powder, slightly soluble in water and in alcohol.

Valuable for chronic gout and lithæmia, and a good intestinal antiseptic.

Ⓟ**STROPHANTHUS** (*Off.* and B.P. 1898). **U.S.**

The mature ripe seeds of *Strophanthus Kombé* (Oliver), (*Apocynaceæ*) freed from the awns, of a fawn colour, and covered with hairs. A section of the seed should give a green colour with a mixture of sulphuric acid 80 and water 20. *S. Courmontii* and several other species have been used as adulterants.

P. Hung. gives *max. single dose* $\frac{3}{4}$ grain (0·05 Gm.), max. in 24 hours 0·15 Gm.

Commercial History of (Holmes).—P.J. i./06,312.

S. Hispidus and *S. Kombé* are the only two species giving a green reaction with Sulphuric Acid. Buying the seed in the pod is the safest method.—G. Sharpe, P.J. i./16,347.

Antidotes to **Strophanthus preparations**—

After stomach pump or emetics give Tannin or Gallic Acid in water, followed by stimulants. Anæsthetics to relieve spasm. Potassium Permanganate has been recommended.

Strophanthus sp. have yielded two crystalline glucosides:—Strophanthin, from *S. Kombé*, giving the green reaction with sulphuric acid; M.pt. 172·75° C.,—and Pseudo-Strophanthin, probably from *S. hispidus*, which is twice as active physiologically.

Ⓟ*Strophanthin.

$C_{40}H_{66}O_{19}=850{\cdot}728$. Fr. Cx. directs to be prepared from *S. hispidus* only.

Dose.—$\frac{1}{300}$ to $\frac{1}{100}$ grain (**0·0002 to 0·0006 Gm.**) hypodermically. U.S. IX. gives average daily dose, caution—*per os*, 1/60 grain, intravenously 1/80 grain. Is irritating at the seat of injection.

Dose by the mouth 1 to 4 mgr. and up to 4 mgr. a day; by intramuscular injection 1 to 3 mgr. a day and by intravenous injection $\frac{1}{4}$ to 1 mgr. and up to 2 mgr. a day. Given by the mouth it is often ill tolerated and strychnine (1 to 3 mgr. in the day) is the best antidote. Signs of overdose: headache, sense of tightness in the chest and præcordia, marked slowing or bigeminy of pulse, marked rise in blood pressure, cardiac arhythmia, insomnia, nausea are least seen with the intravenous use of the substance. Little success in heart affections obtained with the drug taken *per os.*

Contraindicated where there is a high blood pressure and marked arteriosclerosis and to those with acute or chronic nephritis or granular kidney.—B.M.J.E. ii./09,11.

A white glucoside, or "mixture of glucosides" (U.S.). Soluble in water and alcohol 90%, allied in its physiological action to digitalin and of bitter taste. Fuses at 170° C.

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* See note under Digitalis Glucosides.

G. Cohn, writing on glucosides of the Digitalis group, differentiates 3 Strophanthins of Commerce, H. Strophanthin $C_{40}H_{60}O_{16}$ from *S. hispidus*, K. Strophanthin $C_{32}H_{48}O_{16}$ from *S. Kombé*, and G. Strophanthin $C_{36}H_{46}O_{12}+9H_2O$, which is identical with Crystalline Ouabain-Phar. Zentralh. per Y.B.P. 1913,129.

The action of Strophanthin on cardiac tissue. Experimental work on the frog.—A. J. Clark, B.M.J. ii./13,897.

Uses.—As a cardiac tonic and diuretic. Resembles digitalis in action and is employed for same purposes. Occasionally of service where the latter has failed or is not tolerated. Especially valuable in mitral stenosis, but unsuitable in aortic disease; pulse improves in force and rhythm, dyspnœa and palpitation are lessened, appetite is increased, action of bowels and perspiration not affected—non-cumulative. Of value in renal insufficiency.

In heart failure, *intravenous* injection of 8–12 minims of 1 in 1,000 strophanthin solution ($\frac{1}{2}$ to $\frac{3}{4}$ mgr. of the base) has been successful.

Strophanthus is only about half as active on man as digitalis.—B.P. '98 tinctures being used.—L. ii./10,1615.

Strophanthus as diuretic *c.f.* action of Digitalis, p. 385.

Caution.—To our knowledge the drug occasionally acts in an unaccountable manner—loss of consciousness has followed an ordinary dose in a weakened patient.

Inhalation of Tinct. Strophanthi in heart affections.—B.M.J.E. i./14,67.

Granules de Strophanthine, Fr. Cx., $\frac{1}{10}$ mgr. and are coloured pink.

Poudre de Strophanthine au Centième. Fr. Cx. *Max. single dose* $\frac{1}{2}$ grain, Max. during 24 hours $1\frac{1}{2}$ grains approximately.

Ⓟ**Extractum Strophanthi** (*Off.* and B.P. 1898).

Dose.—$\frac{1}{4}$ to 1 grain (0·016 to 0·065 Gm.).

The seeds are first percolated with purified ether, and then with 90% alcohol; the alcoholic percolate concentrated and mixed with milk sugar, so that 2 parts of extract in powder= 1 part of seeds.

Ⓟ**Tinctura Strophanthi** (*Off.*).

Dose.—2 to 5 minims (0·12 to 0·3 Cc.).

Prescribing Note.—It is preferable to prescribe as 'Drops.' If diluted with water in a mixture decomposition of the glucoside is liable to occur with disagreeable effects.—P. MacEwan.

Strophanthus Seeds de-fatted with Ether in No. 30 powder 1, by percolation with Alcohol (70%) *q.s.* to 10. Is four times the strength of the B.P. '98 preparation. This conforms with F.I. U.S. IX. is 1 in 10 with Alcohol (94·9% Vol.), assayed biologically.

Fr. Cx. has F.I. strength with max. single dose 3 minims approx. Max. during 24 hours 12 minims approx.

The 1885 preparation was half the strength of the 1914. This gave good results in pneumonia—5 minim doses with the same amount of Capsicum Tincture.—L. i./07,808; B.M.J. i./07,626.

Physiologically Standardised Tincture of Strophanthus. According to Martin should have minimum lethal dose $\frac{1}{2}$ minim (0·03 Cc.) per 20 Gm. frog in two hours. Strophanthus Tincture properly stored loses little in activity.

The seeds vary greatly in content, hence standardisation is desirable. It must be noted, however, that assayers' reports vary also, *c.f.*, Vol. II.

For a note on the Chemical Assay of the seeds, also for other methods of making tinctures, see Vol. II.

Ⓟ**Tabellæ Strophanthi,** equal to 2 minims of Tincture combined with chocolate. *Dose.*—1 to 3. Ⓟ**Tablets,** Compressed, are also prepared equal to 2 and 5 minims of the Tincture.

***Tablets, Hypodermic,** contain **Strophanthin** $\frac{1}{500}$ grain.

***Ouabain,** $C_{30}H_{46}O_{12}=598{\cdot}518$. A glucoside from Ouabaio wood obtained from a *Carissa sp.* of the same natural order as strophanthus, is in colourless lamels, slightly soluble in cold water, insoluble in absolute alcohol and ether, but soluble in glycero-alcohol (according to Schmidt 1 in 150 water at 11° C. and in 27 alcohol 85%). It gives a red colour with sulphuric acid and has similar properties to Strophanthin, but is much more toxic in action Ouabain has been used for whooping-cough in doses of $\frac{1}{1000}$ to $\frac{1}{250}$ grain every three hours. Study of its physiological action.—B.M.J.E. i./92,27. It is also obtained from *Acocanthera sp., q.v.*

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* Should certainly be *treated* as P1.

P1 STRYCHNINA, (*Off.*), U.S. Fr. Cx.

P1 *Applicable to Ireland also, and Salts of Strychnine.*

$C_{21}H_{22}N_2O_2$=334·301.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**). Fr. Cx.—*Max. single dose* $\frac{1}{12}$ grain. Max. during 24 hours $\frac{1}{4}$ grain approx. The alkaloid obtained from Nux Vomica, St. Ignatius' beans (q.v.) and the seeds of other species of *Strychnos.* In characteristic colourless crystals. Exceedingly poisonous. Its absorption in the rectum is even more rapid than in the stomach, small intestine, œsophagus or colon. Should not be coloured by strong nitric acid (absence of Brucine).

The crystals are supplied commercially coloured with carmine to cover the brownish tinge which develops in hot climates.

Soluble.—Slightly in water, about 1 in 6,700, about 1 in 400 of alcohol 60%, 1 in 150 of alcohol 90%, 1 in 400 of absolute alcohol (Fr. Cx. says insoluble), 1 in 6 of chloroform, nearly insoluble in ether.

Solubility in Carbon Tetrachloride is 0·645 Gm. in 100 Gm. at 17° C.—Y.B.P., 1913,6.

Antidotes.—Apomorphine Injection or Emetics followed by washing out the stomach with Potassium or Calcium Permanganate solution 2 to 5 grains per pint, then give Potassium Bromide 4 drachm dose repeated in 2 drachm amounts every hour if necessary. Chloral in $\frac{1}{2}$ to 1 drachm doses. ***Charcoal*** *ad lib* in water. Chloroform or Ether Anæsthesia. Try also Amyl Nitrite Capsules and Paraldehyde. Artificial respiration.

Strychnine compares with Brucine in toxicity as 3 : 4.—Wright and Dixon. —P.J. ii./08,366,367.

Poison conspiracy against the Prime Minister and Mr. Henderson. Strychnine and Curare concerned, *vide* Curare.

Flavoring.—For Strychnine Salts and preparations containing Strychnine, Syl Aurantii Amari, Syl Menthæ Piperitæ (very full dose); Syrupus Aromaticus (very full dose).

P1 **Pilula Strychninæ** contains $\frac{1}{25}$ $\frac{1}{30}$ $\frac{1}{40}$ $\frac{1}{50}$ $\frac{1}{60}$ $\frac{1}{80}$ and $\frac{1}{100}$ grain.

P1 **Ferri et Strychninæ Citras,**

Average Dose.—2 grains (**0·12 Gm.**) in solution.

In scales varying in colour from garnet red to yellowish brown, freely soluble in cold water. It contains 1% of Strychnine, and Ferric Citrate corresponding to not less than 16% Metallic Iron.

P1 **Ferri, Quininæ et Strychninæ Citras.**

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

This is in scales of a greyish-golden colour like the former; it contains in addition about 15% of Quinine.

P1 **Strychninæ Acetas.**
$C_{21}H_{22}N_2O_2.CH_3COOH = 394·343$.
Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (0·001 to 0·004 Gm.).
In small colourless acicular crystals, soluble 1 in 44 water.

P1 **Strychninæ Arsenas.**
$C_{21}H_{22}N_2O_2.H_3AsO_4,\frac{1}{2}H_2O = 485·293$.
Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (0·001 to 0·004 Gm.).
In small white acicular crystals containing 55·95% Strychnine, soluble 1 in 34 of water.

In phthisis by hypodermic injection of $\frac{1}{2}$% mixture with liquid vaseline. *Dose.*—4 to 15 minims daily.

In pneumonia of the aged, Strychnine Arsenate in doses of $\frac{1}{120}$ grain every 15 minutes or timed according to effect produced has been found of value.

☛ In addition to this acid salt there is another of composition $C_{21}H_{22}N_2O(H_3AsO_4)_2H_2O$. Soluble 1 in $16\frac{3}{4}$.—Dott, P.J. ii./11,173. It contains much less Strychnine (42·8%).

P1 **Strychninæ Hydrobromidum.**
$C_{21}H_{22}N_2O_2HBr + H_2O = 433·245$.
Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (0·001 to 0.004 Gm.).
White crystals, soluble about 1 in 70 of water; in alcohol 1 in 100.

P1 **Strychninæ Hydrochloridum.**
$C_{21}H_{22}N_2O_2,HCl,2H_2O = 406·801$.
Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (0·001 to 0·004 Gm.).
Small trimetric prisms, soluble 1 in 35·5 of water (by our experiments), D. B. Dott finds 1 in 38—P.J. i./15,206; alcohol (90%) 1 in 73.

A 1% (w/v) solution is strongly hypertonic, 0·079 Gm. Sodium Chloride or 0·442 Gm. Glucose to every 10 Cc. renders it isotonic.—P.J. i./12,357.

A case where life in danger had $\frac{1}{30}$ grain increased to $\frac{1}{6}$ grain *pro die* in a month. A Chinaman with beri-beri (paralysis of) had up to $\frac{1}{4}$ grain *t.i.d.* Recovery in both.—M.P., Mar. 13, 1907, *p.* 281.

P1 **Liquor Strychninæ Hydrochloridi** (*Off.* and B.P. 1898).
Dose.—2 to 8 minims (0·12 to 0·5 Cc.).
Strychnine Hydrochloride 1, Alcohol (90%) 25, Distilled Water to 100.

For hypodermic injection. *Dose.*—2 to 6 minims.

Incompatible with *Liquor Arsenicalis*, and with an alkaline salt such as potassium bromide often is. Acidulating the latter with hydrobromic acid will, in most cases, prevent this. (Poisoning by.—L. ii./07, 1173.) Also with Potassium Iodide, for an insoluble Iodide may be thrown out. It is unsafe to prescribe alkaline mixtures containing more than 5 minims of this solution per ounce, or crystals of Strychnine may separate. It is wiser to avoid the possibility by not prescribing with Sodium Bicarbonate, Sal Volatile, etc.

The danger of deposition of strychnine might well be averted by doubling the volume of diluent, making, for example, a tablespoon dose into 2 tablespoonsful.—A. W. Bromley, L. ii./17,472.

A small quantity of Glycerin added in place of equivalent of the spirit prevents crystallisation of the salt round the neck of the bottle.

Jowett showed by experiment that it is safer to prescribe Tincture of Nux Vomica in preference to Solution of Strychnine Hydrochloride when there is danger of incompatibility. There appears to be something in the combination of the Strychnine in the Tincture which tends to hold it in solution even in the presence of alkali.—P.J. i./13,402. H. Finnemore arrived at similar conclusions.—P.J. ii./14,124.

₱1 **Injectio Strychninæ Hypodermica** (*Off.*).

Dose.—Hypodermically 5 to 10 minims (**0.3 to 0·6 Gm.**). Dissolve Strychnine Hydrochloride 0·75 Gm. in recently boiled and cooled Distilled Water 100 Cc.

₱1 **Strychninæ Hypophosphis.**

$C_{21}H_{22}N_2O_2.H_3PO_2,3H_2O=454{\cdot}413$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0.001 to 0·004 Gm.**).

White crystals soluble 1 in 3·3 of water—one of the most soluble of strychnine salts.—P.J. ii./11,173.

₱1 **Strychninæ Nitras, U.S., P.G.V., P. Belg., P. Hung.** *Dose.*—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

P. Hung. gives *max. single dose* $\frac{1}{6}$ grain (0·01 Gm.), max. in a day $\frac{1}{3}$ grain (0·02 Gm.). P.G.V. gives half these amounts.

$C_{21}H_{22}N_2O_2.HNO_3=397{\cdot}319$.

Colourless needles, soluble 1 in 60 of water; in 42 at 25° C. U.S.

₱1 **Tablets, Hypodermic,** $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{40}$, $\frac{1}{20}$ grain.

Kidd's, Dr., Strychnine Nitrate Solution 1 in 200. Various formulæ are provided. One is as follows:—Strychnine 1 grain, Distilled Water 45 minims, Strong Nitric Acid 5 grains, Alcohol (90%) 2½ drachms. Rub the Strychnine with the water in a glass mortar. Gradually add the Spirit and when cold add the Acid. After standing some days it becomes pale lemon colour.—P.J. ii./12,604.

Tabellæ Nitroglycerini et Strychninæ *v.*p. 560.

₱1 **Strychninæ Phosphas Acidus.**

$C_{21}H_{22}N_2O_2.H_3PO_4,2H_2O=468{\cdot}397$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

In light shining crystals, soluble 1 in 31·5 of water.

₱1 **Strychninæ Sulphas,** U.S. FR. CX.

$(C_{21}H_{22}N_2O_2)_2H_2SO_4+5H_2O=856{\cdot}758$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**). FR. CX. *Max. single dose* $\frac{1}{10}$ grain; max. during 24 hours $\frac{1}{4}$ grain approximately.

The neutral salt is in prismatic crystals, soluble 1 in 62 of water; M.Pt. 200° C. It contains $5\frac{1}{2}H_2O$; *i.e.* there is usually a loss on drying of 11·44% approx.—Dott., P.J. i./12,425.

₱1 **Granules de Sulfate de Strychnine,** FR. CX. contain 1 mgr.

₱1 **Hypodermic Injection** 1 in 100. *Dose.*—1 to 6 minims.

₱1 **Tablets,** $\frac{1}{60}$, $\frac{1}{50}$ and $\frac{1}{30}$ grain each, for administration *per os*.

₱1 **Hypodermic Tablets** $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$ and $\frac{1}{30}$ grain.

₱1 **Strychninæ Sulphas Acidus.** *Syn.* HULLE'S SOLUBLE STRYCHNINE.

$C_{21}H_{22}N_2O_2.H_2SO_4+2H_2O=468{\cdot}409$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

In white silky acicular crystals with a slightly acid reaction, soluble 1 in 42 of water.

P1 Strychninæ Valerianas.

A non-crystallisable salt supplied in aqueous solution equivalent to 25% of the base. *Dose.*—$\frac{1}{25}$ minim to $\frac{1}{10}$ minim (=$\frac{1}{100}$ to $\frac{1}{40}$ grain of the base). In dispensing, dilution must be carefully made, and part rejected if necessary. A useful nervine tonic, especially for hysterical patients.

Uses of, and References to Strychnine Salts.

Cushny says there is not the slightest evidence that medicinal doses act upon the heart. Its injection prior to surgical operation is a mere ceremonial rite—it is more likely a vasomotor remedy.—P.R.S.M. Therap. Sect., Nov. '10, p. 7; B.M.J. i./11,863, see also L.ii./15,296.

In practice we are, however, familiar with good results somehow from its use—if empirical it is certainly rational and beneficial.—Sir Dyce Duckworth, B.M.J. i./11,1217. In degeneration of the heart, the only drug of real value is Strychnine.—Whitla.

For arresting progressive muscular atrophy Strychnine hypodermically the only treatment. Acts more directly than by mouth.—Gowers, Diseases of the Nervous System.

In cardialgia, chorea minor, incontinence of urine, gastralgia, drink craving, Strychnine is useful internally. It has been used in beriberi 1/50 grain injected into each thigh daily.

To control post-partum bleeding, and to cure paralysis of soft palate after diphtheria in children by hypodermic injections of $\frac{1}{32}$ to $\frac{1}{20}$ grain.

In broncho-pneumonia of infants one minim doses of the Liquor every four hours as routine practice excepting where there is diarrhœa or marked respiratory stridor. When signs of advancing cardiac strain add 1 minim doses of Strophanthus Tincture, B.P. 1885.—B.M.J. ii./08,372.

In severe cases of puerperal sepsis with failure of circulation often of great value hypodermically.—B.M.J. ii./09,1038.

In myasthenia Strychnine hypodermically is frequently beneficial but not curative.—L. i./10,355.

Failure of vision and colour perception improved under Strychnine. First the Sulphate, gr. 1/30 three times daily, was ordered. Vision improved during six weeks, then injections of Strychnine (gr. 1/30) into the temples twice a week were given; six tablets daily by the mouth. Vision improved gradually under the treatment.—Oph., Mar., 1911,220.

For sea sickness—Strychnine Sulphate $\frac{1}{60}$ to $\frac{1}{30}$ grain with Atropine Sulphate $\frac{1}{150}$ grain, either hypodermically or by the mouth in preference (but then less efficient), and repeated in a few hours if necessary. Surface of body should be kept warm.—B.M.J. ii./10,1199.

Strychnine as diuretic, *c.f.* action of Digitalis, p. 385.

Ⓟ SULPHONAL (*Off.*).

$(CH_3)_2.C.(SO_2.C_2H_5)_2=228{\cdot}283.$

Sulphonmethanum, U.S. Fr. Cx., P.G.V., P. Hung.

Expired Patent 12563 of 1888.

Manufacturers and wholesale and retail vendors must label Poison and treat otherwise as Ⓟ.

Syn.—Dimethyl-methane-diethylsulphone. Produced by oxidation of a compound of ethyl-mercaptan and acetone. In colourless crystals or powder, tasteless and odourless, *soluble* about 1 in 450 of water. In alcohol 1 in 80, freely in hot alcohol. Melts at 125·5° C.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**). In cachets or suspended with mucilage. Fr. Cx. and P.G.V. have *max. single dose* 30 grains; max. during 24 hours 60 grains. Should be finely powdered, and followed by a draught of hot fluid. Unless in solution, a dose should be given an hour before sleep is desired.

Antidotes.—See chapter on.

Uses.—Soporific, but is not curative of pain; does not affect digestion, pulse, or temperature, especially desirable for nervous subjects. Useful in chorea. Is slow in action on account of slight solubility; 30 grains may be given in solution in 1 ounce of brandy with 2 ounces of boiling water added (=about 140° F.).

In the Sulphonal group it was held that the more Ethyl groups introduced, the more hypnotic effect—but Sulphonal with its two Ethyl groups is still the most popular, and Trional is more popular than Tetronal, which is seldom employed.—B.M.J. ii./10,1113.

Trismus neonatorum has been cured by enemata of 3 grains supplemented by internal use, but its use is not without risk where considerable physical prostration. Recovery after 365 grains in an adult.—L. i./04,219. Also after 5 to 6 Gm.—L. i./09,811.

Enuresis well treated with small doses.—L. ii./17,728, *c.f.* Therap. Index.

Ⓟ **Tablets,** 5 grains (**0·3 Gm.**). *Dose.*—1 to 6. Should be crushed and taken in warm water. Ⓟ**Capsules** contain 5 and 10 grains.

Ⓟ**Effervescent Sulphonal** contains 5 grains in 1 drachm.

Ⓟ**Haustus Sulphonal.** Sulphonal 20 grains to 1 ounce of **Mistura Mucilaginosa,** (Mucilage of Gum Acacia 2 drachms, Syrup 30 minims, Water to 1 ounce.) (Was in G.H.)

'**Reversed Sulphonal.**' *i.e.*, Diethyl-methane-dimethyl-sulphone is probably included as Ⓟ by new Order in Council. It is not a homologue of sulphonal but a metameride.—B.M.J. i./13,836.

Ⓟ**Methyl-sulphonal** (*Off.*). *Syn.* ***Trional** (T.M. 273851)—Fr. Cx. Diethyl-sulfone-methyl-ethyl-methane. **Ph. Ned., P. Belg., P. Helv., P. Jap., Sulphonethyl-methanum, U.S.**

The signature of a *firm*, Registered No. 279228, has also been used in connection with the name Trional. Expired Patent 16333/1888.

N.B.—Conditions of Sale as for Sulphonal q.v.

$CH_3.C_2H_5.C.(SO_2.C_2H_5)_2=242·304$.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**), in cachets, in a large cup of hot liquid. Fr. Cx. gives latter approx. as max. single, and during 24 hours. P.G.V. has max. during 24 hours 60 grains.

An oxidation product of mercaptol made by the condensation of methylethylketone with ethylmercaptan.

In minute crystals, soluble 1 in 320 of water—*Off.* We find in practice, 1 in 420 in alcohol 90% about 1 in 11, and in ether. M.pt. 76 to 76·5° C.

Uses.—Has a hypnotic action intermediate between those of sulphonal and tetronal.—B.M.J. i./90,87. Has cured chorea. Useful for the insane. Tetronal is the better sedative, Trional is more effective in sleeplessness connected with neurasthenia and organic brain disease. Both are useless in insomnia due to pain, and in morphine and cocaine habits. Cured case of combined alcoholic and nicotine poisoning.—L. ii./01,223.

Ⓟ**Tablets,** 5 grains (**0·3 Gm.**). *Dose.*—1 to 6.

Recovery after effects of 125 grains.—L. i./03,1096.

Poisonings by Trional successfully treated by injections of Strychnine, Smelling Salts, and 1 drachm doses of Sulphate of Magnesium every four hours.—L. i./10,04

Ⓟ**Haustus Trional,** 30 grains to Mucilage Mixture 1 ounce. (Was in G.H., *c.f.* Haustus Sulphonal),

Applying Hans Meyer's Theory *q.v.*, Therapeutic Index—Insomnia, to these methane derivatives of the Sulphones, the coefficient of Trional is 4·46, Tetronal 4·04, Sulphonal only 1·59, which is in practice about their activity. *Trional best of the three, Sulphonal should be dropped, Tetronal too dangerous.*—B.M.J. i./09,554.

SULPHUR.

S=32·06.

Dose.—20 to 60 grains (**1·2 to 4 Gm.**) in milk or treacle, with confection of senna, or as Pulvis Glycyrrhizæ Compositus. Sublimed sulphur in fine powder, for use either internally or externally, is preferred to Precipitated.

Uses.—A good laxative for children, and for adults who have piles. In chronic skin affections and rheumatism. Sublimed Sulphur checks dysentery.

Tetanus cured by internal and external use.—B.M.J. ii./05,1160.

Sweating of the feet has been treated by drachm doses thrice daily.

In diphtheria Sulphur as an insufflation caused death in a child of 9. The practice (dangerous) it appears is common in South Wales. —L. ii./16,29.

Glycerinum Sulphuris.

Dose.—For plugging cavities 1 to 4 ounces as required.

Precipitated Sulphur 3, Glycerin 1 with Phenol 1 per cent. of the whole, but a considerable proportion vanishes in the steam. The amount of Phenol is large, sterilise in an open wool plugged flask.

Sulphur, Antiseptic Power of.—By its production of Sulphuretted Hydrogen when given *per os*, also by its local action, *e.g.*, when placed in tissues there is strong indication of antiseptic action. The use of Sulphurous Waters in this direction is well known. Sulphur *per os* was used to combat typhoid in the Transvaal, and latterly Sir Arbuthnot Lane has used Sulphur in Glycerin for injecting into suppurating sinuses with success, producing complete antiseptic action. These results are due to a peculiar body termed philothion, which exists in tissues. The tissues and this body react to produce Hydrogen Sulphide. The treatment is preferable to Iodoform,—the Sulphur is thought to enter into the composition of philothion.—From a French contribution.

Emulsio Sulphuris.

Sublimed Sulphur 1, finely powdered in sterilised Almond Oil 16.

Ulcerative colitis successfully treated by injection of 4 ounces through an artificial anus into the colon of the above emulsion every other day, and alternate days thorough sluicing with boric acid lotion. 7 weeks treatment. Shiga employed Enemata of Gum Mucilage with Bismuth, Bismuth Subgallate or Iodoform.

Emulsion of Sublimed Sulphur in glycerin used to swab out gum pockets in dental work.—B.M.J. ii./08,479

Sulphur Lotum, U.S., is washed with ammoniated water.

'Colloid' Sulphur prepared by precipitating sulphur from polysulphides with an acid in the presence of albumin, is said to be a better antiseptic than ordinary precipitated sulphur.—Pres., Dec., 1911, p. 302. *c.f.* pp. 350, 362.

Acne vulgaris in its early stages is well treated by spray applications of a fine suspension ("Solution") of Colloid Sulphur—allowing one application to dry before spraying on the other—previously the skin should be well washed with an alkaline soap and hot water, and then copious douches of cold water. An important point in the treatment consists of uniformly painting the affected part with a freshly prepared 1% Solution of Iodine in Alcohol which may be repeated in a week's time. If seborrhœa of the scalp accompanies the acne it should receive suitable treatment.—Pr., Nov., 1911, p. 715.

In skin affections the skin has been painted with a solution of Sulphurated Potash 1 in 2 twice. The part is then subjected to Acetic Acid Vapour or dabbed with 5 to 10% Acetic Acid. Sulphur is adherent as a thick coating. —B.M.J.E. i./13,96.

Ringworm of the groin (singularly intractable) treated by means of Nascent Sulphur, formed by applying a 6% Hyposulphite of Sodium Solution on lint covered with oil silk for about 10 minutes, followed by painting with 3% Tartaric Acid Solution.—J.M.H. MacLeod, Pr., Dec., '12,827.

Confectio Guaiaci Composita, L.H. **'Chelsea Pensioner.'**
Dose.—1 drachm (4 Gm.).

Guaiacum Resin in powder 2, Sublimed Sulphur 4, Mustard 4, Potassium Nitrate 1, Rhubarb Root 1, Treacle to 16. Acid Potassium Tartrate is added to some formulæ.

St. M.'s H. has Guaiacum Resin 10, Magnesium Carbonate 10, Sublimed Sulphur 15, Treacle 60. This is a more usual formula.

Confectio Sulphuris. (*Off.*).

Contains 45% Precipitated Sulphur with 11% Acid Potassium Tartrate. Differs in quantities from B.P. '98

Dose.—1 to 2 drachms. (4 to 8 Gm.).

Confectio Sennæ et Sulphuris. C.H., U.C.H.

Dose.—1 to 2 drachms (4 to 8 Gm.).

Confection of Senna 1, Confection of Sulphur 1.

St. M.'s H. has Confection of Senna 3, Sublimed Sulphur 1.

Pulvis Guaiaci Compositus (Chelsea Pensioner), St George's H.
Dose.—20 to 40 grains (1·2 to 2·6 Gm.).

Guaiacum Resin, Precipitated Sulphur, Heavy Magnesium Carbonate, Gum Acacia and Potassium Bicarbonate, equal parts. The Confection (*v.* above) is more used.

Jephson's Powder. *Dose.*—60 grains (4 Gm.).

Precipitated Sulphur 2, Guaiacum Resin 1. For tonsillitis, acne, and constipation.

Tablets of Precipitated Sulphur 5 grains with Potassium Acid Tartrate 1 grain are prepared.

'Stearettes' of Sulphur 5 grains each are prepared.

In the alimentary canal the action of Sulphur only takes place at a point where its contents have ceased to have an acid reaction, and the formation of H_2S and possibly Sulphides will be hastened by an increase in alkalinity.—P.R.S.M., Therap. Sect. Dec., '10, p. 16. 'Stearettes' of Sulphur are hence suggested in the treatment of acne furunculosis, urticaria, etc

Trochisci Sulphuris. (*Off.* and B.P. 1898). *Dose.*—1 to 6.

Contain approx. precipitated Sulphur 5 grains and Acid Potassium Tartrate 1 grain.

Garrod's formula is 4 grains of the Sulphur with 1 grain of Potassium Acid Tartrate in each. See also **Pastilli.**

Continued use is beneficial in chronic diseases of alimentary canal and liver, also of skin and articulations.

Unguentum Sulphuris. (*Off.* and B.P. 1898). 1 to 9 Benzoated Lard.

Scabies is treated by Sulphur Ointment after washing with soft soap. Use equal parts of the B.P. Ointment and Vaseline.

The action of Sulphur in acne vulgaris and acne rosacea is still unexplained, doubtless it is antiseptic.—B.M.J. ii./13,1012.

Unguentum Sulphuris et Zinci cum Kaolino. Sulphur 4, Zinc Oxide 3, Kaolin 1, Benzoated Lard 8. For arresting sweating of the feet.

Ⓟ Unguentum Sulphuris cum Hydrargyro, U.C.H.

Sublimed Sulphur 30, Sublimed Mercuric Sulphide 2, Ammoniated Mercury 2, Arachis Oil 12, Lard 54. Useful in skin diseases.

To this may be added, if ordered, either 2 grains of vermilion, 10 minims of eucalyptus oil, 10 grains of phenol, or 5 minims of creosote per ounce of the ointment.

Unguentum Sulphuris Hypochloritis.

Sublimed Sulphur 12, Essential Oil of Almonds 2, Prepared Lard 84; mix, and add with quick manipulation Sulphur Chloride 2 (a Reddish Liquid $S_2Cl_2=135{\cdot}04$).

Keep in a stoppered bottle; is sometimes made double this strength. Useful in acne, psoriasis and scabies.

Unguentum Sulphuris Iodidi (B.P. 1898). Contains Sulphur Iodide 4 ($S_2I_2=317{\cdot}96$), Glycerin 4; mix in a warmed mortar, and add Benzoated Lard 92. For tinea.

Unguentum Sulphuris et Naphthol Salicylatum.

Tinea circinata can be rapidly cured by an ointment of Sulphur ½ drachm, Salicylic Acid 10 grains, Naphthol 3 grains, Vaseline 1 ounce. —L. i./09,966.

Sulphuretted Hydrogen Solution.

Is prepared by saturating Distilled Water with Hydrogen Sulphide (H_2S). To preserve, add a little Carbon Di-sulphide.

Lotio Sulphuris cum Sapone.

Precipitated Sulphur 30, Eau de Cologne 60, Glycerin 4, Soft Soap ½, Rose Water to 500. Is recommended for acne of the face.—W. W. W.

Sulphaqua Charges are for dissolving in water to produce sulphur baths for use in skin diseases, gout and rheumatism.

Balneum Sulphuratum St. Th. H. Sulphurated Potash ⅛ to ¼ ounce per gallon. **St. M.'s H.** is 10 ounces to 30 gallons.

Pomatum Antipsoricum, F.E. *Syn.* **Helmerich's Pomatum.** Sublimed Sulphur 10, Distilled Water 5, Almond Oil 5, Potassium Carbonate 5, Lard 35. All by weight. Is used for scabies.

FR. Cx. has poppy seed oil *vice* almond oil.

Selenium. Se=79·2.

This element was originally discovered by Berzelius in the Lead Chamber—deposits in the manufacture of Sulphuric Acid. It occurs in various Blendes and minerals,—with Lead, Copper, Silver, Iron, etc.—at least three allotropic varieties are known. The chief source of Selenium is Iron Pyrites in which a part of the Sulphur is replaced by Selenium. Traces of Selenium occur in Bismuth preparations.

Selenium and Tellurium belong to the Sulphur group. Selenates and Tellurates are highly poisonous.—unlike Sulphates.

Colloidal Selenium, see **Colloidal Metals.**

A compound, **Selenium with Eosin** had a specific destructive effect on tumour cells in mice. It is readily soluble in water, and more than 2½ mgr. are required to kill a healthy mouse.—the tumour on injection takes up the colour, whilst a healthy animal becomes pink all over.—Wassermann, B.M.J. i./12,39,51.

Pilula Selenii Oxidi cum Eosin.

Dose.—One, once or twice daily, increased if tolerated.

Selenium Oxide $\frac{1}{100}$ grain, Eosin $\frac{1}{10}$ grain. has been used as representing the above idea.

Selenium Oxide. *Dose.*—1/64 grain (0·001 Gm.) internally 3 to 4 times daily increasing the dose gradually.

Cancer treated with on the assumption that it conveys Oxygen to the Sulphur in the organism, thereby increasing secretion of Sulphuric Acid in the urine. It has been observed that Sulphuric Acid excretion is lessened in cancer patients.—M., 1913.

For carcinoma Selenium Compounds that are soluble, non-toxic and easily carried by the blood stream, advised, *e.g.*, Selenium Dioxide, in small doses frequently repeated and long continued. Selenium preparations do not easily lose their effectiveness as oxidising agents. In the body they constantly move between the higher and lower degrees of oxidation, and their oxidising power is thereby constantly regenerated.—E. G. Kessler, Med. Record, June 1, 1912.

Organic Selenium Compounds.

(1) **Diamino-diseleno-benzene Hydrochloride.**

$NH_2C_6H_4Se.SeC_6H_4NH_2 2HCl=415·512$.

A brown amorphous powder easily soluble in water but slowly precipitating. Its analogy with Salvarsan makes it of interest but its instability is a disadvantage. This compound has been made by G. T. Morgan.

(2) **Diseleno-phenyl-arsonic Acid.**—$H_2O_3AsC_6H_4Se.SeC_6H_4AsO_3H_2=$ 560·476. A lemon coloured powder insoluble in water but soluble with the addition of one molecule of Sodium Hydrate.

We have had this tried pharmacologically in a 1% neutral solution, the result being that 0·12 Gm. per kilo intravenously killed a rabbit within 4 minutes, whilst a control of Salvarsan 0·1 Gm. per kilo was tolerated.

SUPPOSITORIA.

Suppositories containing various Medicaments weigh, when prepared with Cacao Butter, 15 grains and upwards. They are preferred with both ends conical shaped so as to pass more easily and be retained by the sphincter muscle.

Suppository Mass for Use in and Export to Hot Climates, (a) **Gelatin Basis.**

As pointed out under Ovule Masses, it is almost impossible to make a basis that shall stand temperatures above 100° F. and yet melt at body temperature. The best one can do is to fortify with Gelatin so that the melting point is *not much above* 98° *to* 99° *F.*

Bougie Mass (*q.v.*) carries out these conditions when there is a sufficiency of adherent moisture on the part.

(b.) **Theobroma Basis**—

The *Off.* statement on the subject is, "More or less Beeswax may be used in place of Theobroma according to prevailing temperatures," 5 to 10% is commonly employed. We consider 15% is best, but it must be remembered that different samples of Theobroma Oil and White Wax each have somewhat different melting points. Certain Melting Points we find are yielded by mixtures in proportions stated under "Ovule Masses for Hot Climates." The remarks there given apply equally to Suppositories with Theobroma Oil basis.

∗**Sempules** (T.M. 329438) for the treatment of hæmorrhoids are suppositories with a wide core, coated with a Medicated Theobroma basis. The suppository has a bulb at each end, which it is claimed keeps the stem in the anal canal. They are medicated with the usual medicamenta and are supplied in gelatin with two Melting Points 80·6° F. and 89·6° F., also with Theobroma basis.

TABLETTÆ.

(Compressed Tablets).

In the preparation of Tablets the material has first to be *granulated,* to make it flow easily from the 'hopper' and to prevent it sticking between the dies and punches of the machine ; this is effected by moistening with a little alcohol or water (to which, if desired, a minute quantity of mucilage diluted about 1 to 4, may be added), rubbing through a suitable sieve (No. 16), and drying *thoroughly* either by very slight heat, or better, by exposure to the air if sufficiently dry at the time. The decomposition, melting points or volatility of the chemicals to be compressed must be borne in mind, Salol, Beta-Naphthol, Benzoic Acid, Sulphonal, Trional and Phenacetin should not be heated. To obviate the sticking referred to, lubrication with Boric Acid (2%), or spraying with a solution of Soft Paraffin or Cacao Butter in 1 in 6 each Ether and Alcohol, or less of the latter is resorted to in some instances.

Substances already in small crystals, *e.g.* Potassium Chlorate and Ammonium Chloride, do not require this treatment. Tablets *to dissolve like lozenges* require half their weight of a mixture of equal parts of Acacia and Tragacanth. Owing to ***Incompatibility,*** Sodium Bicarbonate and Calomel, Saccharin and Rhubarb, Salol and Camphor, Salol and Thymol, Caffeine Citrate with Acetanilide and Antipyrin, Salicylic Acid and Iron Compounds, Chloral and Alkalis, Mercuric Chloride and Metals, oxidising agents, *e.g.* Potassium

Chlorate and Permanganate, with Charcoal, Sulphur, Iodine or Sugar, should not be compressed together.

Five or ten per cent. of (potato) starch thoroughly dried is useful to ensure rapid breaking up of the Tablet. Deliquescent compounds should be treated with Gum Acacia or Tragacanth.

Similarly, if the powder is of a very dusty nature the judicious use of a little of these gums or of glucose or 10% Gelatin Solution is an advantage. Fibrous drugs may have 5% Dextrin. Many substances if compressed too hard are liable to cause the tablet to crack—this is particularly the case with Phenacetin and Antipyrin—the least possible amount of pressure should be applied that will produce a permanent tablet.

Feculose. A cellulose product is also used as a binder in tablet making —a 15 to 20% solution being employed. It is also used to coat pills.

The majority of 5-grain Tablets are made to weigh 6¼ grains with Milk Sugar.

Acetanilide. 1 grain in 1⅗ grains. Add 5% Potato Starch.

Acid Aceto-Salicylic (*Syn. Aspirin*). A little lubricant may be necessary.

Aloin as Arsenious Acid, *q.v.*

Alum. Dry thoroughly to remove water of crystallisation.

Arsenious Acid. Sugar of Milk, with a small amount of lubricant

Balsams. Mix with 25% Magnesia and evaporate to dryness.

Bismuth Carbonate and Sub-nitrate. Make 5 up to 6¼ with Cane Sugar (some use Lactose), adding a small percentage of lubricant.

Bismuth Salicylate, as Salicin.

Bismuth and Soda. Bismuth Carbonate 3, Sodium Bicarbonate 2, Lubricant *q.s*

Caffeine, as Arsenious Acid.

Calomel. Sugar of Milk as diluent.

Cardomoms may have 5% Dextrin.

Cascara. Compress the Extract properly granulated.

Charcoal to have 25% Cane Sugar or Acacia, or Gelatin Solution with a small amount of lubricant.

Codeine, as Arsenious Acid. *Digitalin*, as Arsenious Acid.

Dover's Powder. 2½ grains in 3 grain tablet.

Effervescent Materials may be granulated separately and mixed in the dry condition.

Ginger may have 5% Dextrin.

Gregory's Powder. Make 5 up to 6¼ with Cane Sugar, moistening with Water.

Grey Powder. Needs sugar and Strong Mucilage.

Guaiacol. Make up with Sugar, adding Water and Lubricant *q.s.*

Ipecacuanha. Make up with Sugar and Water. Some employ 5% Dextrin.

Mercuric Biniodide (for administration *per os*) as Arsenious Acid. *Morphine*, as Arsenious Acid. *Nux Vomica Extract*, as Arsenious Acid.

Oily Substances require 2 to 5% Calcined Magnesia.

Opium. Mix with Sugar or Sugar of Milk, using a little lubricant.

Pancreatin. 5 grains in 6¼ grain tablet.

Pepsin. Mix with Sugar, granulate with 60% Alcohol, and use lubricant *q.s.*, 5 grains in 6¼ grain tablet.

Phenacetin. Make 5 grains up to 6¼ grains with Sugar, 5% Potato Starch, and a little Glucose useful. Lubricant, *q.s.*

Phenazone. Make 5 up to 6¼ with Sugar.

Podophyllin. as Arsenious Acid.

Quinine, as Salicin. 2 grains in 2¼ grain tablet.

Saccharin prepared with Sodium Bicarbonate, *q.s.*

Salicin. Mix with Sugar, and use lubricant *q.s.*

Salol requires 10% Potato Starch, with Sugar. 5 grs. made up to 6¼.

Soda Mint. Sodium Bicarbonate, Peppermint Oil, Acacia, *q.s.*

Sodium Salicylate. Make 5 up to 6¼ with Cane Sugar, Lubricant *q.s.*

Strychnine as Arsenious Acid. *Sulphonal* as Salicin.

Thyroid. Made of Desiccated Thyroid Gland with lubricant *q.s.*

Zinc Sulphate for lotions. Remove water of crystallisation.

Stearettes, *i.e.*, Tablets coated so as to be more likely to dissolve in the intestines than in the stomach, *vide* p. 644.

Tablet Triturates are made in metal or vulcanite moulds which are worked by hand, yielding 50 to 200 at a time, the weights ranging from ½ grain (0·03 Gm.) to 1 grain (0·06 Gm.) and the diameters between ⅛ and $\frac{9}{32}$ inch, and ⅛ inch in depth. The active ingredient is mixed with Lactose or Sugar, the whole being massed together with a little alcohol or alcohol and water.

For Hypodermic Tablets, Sterilised Milk Sugar, or Cane Sugar is a useful diluent. These are prepared under the strictest aseptic precautions. A little Boric Acid is useful as lubricant. Dried Neutral Sodium Sulphate, Sodium Chloride and Ammonium Chloride are also employed in some instances. Hypodermic Tablets are well made in a Tablet Triturate mould with holes $\frac{5}{32}$ in. in diameter, the plate being $\frac{1}{10}$—⅛ inch in depth.

Notes on Manufacture of Tablets.—P.J. ii./08,276; ii./11,432.

For List of Tablets in general demand, *see* Index.

TAMPONS.

For vaginal and uterine medication the following are made. The pledgets are globular in shape, about 1½ in. in diameter, composed of **wool, gauze covered.**

Glycerin Tampons. Saturated with glycerin. **Tannin Tampons,** S.H. Saturated with 1, 5 and 10% Tannin in Glycerin. **Ichthyol Tampons** saturated with 5, 10 or 20% Ichthyol in Glycerin. **Iodoform Tampons,** S.H., with 5% Iodoform in Glycerin.

TEREBENUM.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A colourless liquid consisting of dipentene and other hydrocarbons, produced by the action of sulphuric acid on oil of turpentine and distillation. Sp. Gr. 0·862 to 0·866,—*Off.* It has an agreeable odour resembling fresh-sawn pine-wood. Boils at 160 to 170° C. U.S.

Modifications of Pharmacopœial Standards. The O.R. Test is useless. Owing to change in character of Turpentine the specific gravity of Terebene is invariably lighter. It should distil mainly between 165 and 185° C., not more than 5% below 160° C.—B. F. Howard, B.P. Conf., 1919.

Soluble about 1 in 4 alcohol 90% by our experiment. *Off.* says 1 in 5. The substance is indefinite, and a sample we examined is as clear 1 in 4 as 1 in 5; soluble in all proportions in absolute alcohol or chloroform, and largely in glacial acetic acid. It is not miscible with water, but may be emulsified by mixing it with one-sixth its weight of tragacanth powder, then adding water and shaking.

Uses.—An agreeable antiseptic, disinfectant, and deodoriser. The vapour is a useful sedative and antiseptic inhalation in phthisis, *e.g.*, in a respirator, and, administered at the same time in 5-minim doses. For winter cough, drops may be taken on sugar, and it may also be inhaled. Useful also in dysentery and in hay fever.

Terebene may produce albuminuria in gouty kidney disease.—L. i./95,1434; and has caused hæmaturia.—L. i./04,652.

Pruritus.—Recurrent cases often accounted for by mental worry. Terebene on sugar is a good intestinal disinfectant and stimulant, also useful in urticaria in children, *e.g.*, in a mixture with Magnesium Carbonate.—L. ii./12,968.

Haustus Terebeni.—Vic. Park.

Terebene 10 minims, Mucilage of Tragacanth 1 drachm, Glycerin 1 drachm, Cinnamon Water to 1 ounce.

Pastils, contain 2 minims. **Capsules** 5 and 10 minims.

Vapor Terebeni, T.H.

Terebene 40 minims, Light Magnesium Carbonate 20 grains, Distilled Water to 1 ounce.

A teaspoonful in a pint of water at 140° F. for a stimulant inhalation. For medicating antiseptic respirators, 10 drops of a mixture of equal parts, Terebene, Phenol, and Spirit of Chloroform, is often used.

In whooping cough inhalation good, and as liniment.—L. i./09,35.

Terpinum Hydratum, U.S., FR. CX., P. HUNG.—*Syn.* TERPINE. $C_6H_8(OH)_2.CH_3.C_3H_7+H_2O=190{\cdot}226$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**) or more, in cachets, or pills, or suspended.

Prepared by acting during cold weather upon Rectified Oil of Turpentine 4, Alcohol 80% 3, with Nitric Acid 1 in flat dishes. Crystals separate after several days, and are recrystallised from 95% Alcohol rendered slightly alkaline. Yield 12% of the oil taken.—Caspari.

Sir W. A. Tilden, F.R.S., Prof. W. H. Perken, F.R.S., and J. C. Umney on Terpenes—advance course lectures.—P.J. i./12,581, 651, 723, 756, 817. See also P.R., July, 1912, Synthesis of the Terpenes—*ibid.*

A derivative of oil of turpentine in prismatic crystals, soluble in water about 1 in 250, 1 in 44 of alcohol 90%, and about 1 in 6 in oils.

Flavoring.—Prescribed as **Linctus Pini Terpin et Heroin** *q.v.*, lessens cough; has been used with success in bronchitis, chronic and subacute; it assists expectoration, *e.g.*, in initial catarrh of phthisis; useful as a hæmostatic in bleeding from lungs. Diuretic also.

Terpinol. *Dose.*—1½ minims (**0·1 Cc.**) or more in pill, or gelatin capsule. An agreeably aromatic liquid, containing bodies of the composition $C_{10}H_{16}=136{\cdot}178$. $C_{10}H_{18}=154{\cdot}194$. Is obtained by the action of dilute sulphuric acid on terpene. Miscible with alcohol in all proportions, but insoluble in water. It is used for lung affections; if it disorders the stomach it should be given with meals. In pulmonary hæmorrhage in 3 drop doses used with advantage.—J. W. Allan, Glas. Med. Jl., Nov., 1913.

Methylene Blue dissolves in boiling Terpinol producing a colourless solution; the colour, however, precipitates again on cooling.—W. T. Robinson.

Terpineol. *Syn.* TERPILENOL. $C_{10}H_{17}OH=154{\cdot}194$. A product of fractional distillation of Terpinol Sp. Gr. 0·940 used for disguising odour of Iodoform and for scent making (in the name of Artificial Lilac). *Syn.* **Cinyl Alcohol,** described—Allen, 1911, Vol. IV., p. 280.

THEOBROMA.

The seeds of Cacao, *Theobroma Cacao* (*Sterculiaceæ*). When heated and deprived of husk and membrane, these yield **Cocoa nibs.** The nibs ground, and most of the oil pressed out, produce, when reduced to powder, the best forms of **Cocoa** for use as a beverage.

For further details on Cocoa, see Vol. II.

Chocolate and Cocoa, a disparagement of.—Chocolate and Cocoa containing a considerable proportion of Theobromine if taken in excess is thought to be harmful. Theobromine is said to be a poison coarsening and degrading the brain by inhibiting growth. It is stated that Cocoa retards the absorption of the proteins and fats of the food, especially those forms of Cocoa in which the fat has been partially removed, while on the other hand Cocoa with a large percentage of Oil delays gastric secretion and may give rise to dyspepsia. The detrimental effects are in the main due to the Theobromine.—L. ii./12,118.

Oleum Theobromatis. *Syn.* CACAO BUTTER.

The concrete oil of the seeds (yield about 45%). Melting at about 86 to 91·4 F. (30 to 33° C.), *i.e.*, below the temperature of the body, is much used for suppositories. For substances which lower the melting point of the oil, and for export to hot climates, it is well to add 5 to 15% yellow wax. (*c.f.*—'Ovules.').

Note on Cacao butter and substitutes.—P.J. ii./09,158.

To deodorise for cooking, it has been suggested to heat the oil in an open pan to 370° F. for five minutes and cool again, and to give it butter consistence to add to each 4 parts of cacao butter melted, 5 parts of cotton seed oil.

Pasta Theobromatis, Chocolate.

This is made by grinding the nibs into a paste, with sugar and vanilla or other flavouring added; it should contain not more than 50% of sugar and about 25% of fat (*Oleum Theobromatis*), and be free from gum, added starch, or other admixture.

The author uses chocolate for the preparation of medicated **Tabellæ**. On account of its agreeable flavour and the preservative action of its fat and sugar, it forms a useful basis for administering many medicines. The solvent action of its fat renders it eminently useful for fixing **Nitro-glycerin, Erythrol Nitrate, Mannitol Nitrate, Menthol,** and alkaloids. For full list *vide* Index—Tabellæ.

Theobromina.* **Ph. Ned.**

$C_5H_2(CH_3)_2N_4O_2=180·139$ (*See also* p. 243). *Syn.* DIMETHYL-XANTHINE, SANTHEOSE.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

Alkaloid, about 1 to 2% from the seeds, in white crystalline powder, sparingly soluble in water, alcohol and ether. Caffeine is trimethyl-xanthine. 2% solutions may be obtained with aid of Tri-Sodium Phosphate.

Uses.—As a diuretic, relieves cardiac and renal dropsy, and in angina pectoris, 20 to 30 grain doses spread over 24 hours lessen the frequency and severity of attacks. Given in cachet and pill.

A tendency to cardiac failure in pneumonia is often well treated by strong coffee. It has a tonic effect on the heart.—Burney Yeo.

Theobromine-Sodium-Sodio Acetate. *Syn.* **Theo-Sod-Acet.**

✱AGURIN (T.M. 322517). $C_7H_7N_4O_2Na+NaC_2H_3O_2=284·565$.

Dose.—10 to 15 grains (0·6 to 1·0 Gm.), up to 45 grains daily in fresh solution.

White crystalline hygroscopic powder soluble 1 in 2 of water and about 1 in 200 of alcohol 90%. In dropsy, sciatica and neurasthenia. Is strongly diuretic in action. Not to be given with acid substances, nor with sugar or gum. To be preserved from the air, the CO_2 of which tends to decompose it. Relieves cardiac dropsy.

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* Note this body is an Ureide and may be included in the Order as a Ⓟ Poison, *c.f.* Ureides, but in our opinion it can *not* be considered poisonous in therapeutic doses

Theobromine-Sodio Sodium Formate. *Syn.* '**Theo-Sodo-Form**' * **Thephorin** (T.M. 278520). $C_7H_7N_4O_2Na.HCOONa.H_2O$ = 288·16.

Dose.—8 to 15 grains (**0·5 to 1·0 Gm.**).

A white powder soluble in water; analogous in action with 'THEO-SODO-SAL.' Diminishes coagulability of the blood. **Tablets** 8 grains.

Theobrominæ Aceto-Salicylas. $C_7H_8N_4O_2C_9H_8O_4$ = 360·248. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline powder soluble in alcohol. Has some advantages due to containing the Aceto-Salicylic grouping.

Theobrominæ et Sodii Salicylas (*Off.*).—*Syn.* '**Theo-Sodo-Sal,**' * **Diuretin** (T.M. 223214). P. AUSTR., F.E., PH. NED. $C_7H_7NaN_4O_2+C_6H_4(OH)COONa$=362·206. *Dose.*—10 to 20 grains (**0·6 to 1·2 Gm.**). Max. dose *pro die* 90 grains.

Manufacture.—Rub Theobromine 18 to a paste with water 10; Dissolve Sodium Hydroxide 4 or *q.s.* in water 8 and add to the Theobromine until clear. Add Sodium Salicylate 16, filter and evaporate on a water bath or *in vacuo.*

A sodio-salicylic compound containing about 50% of sodium-theobromine in white powder, soluble 1 in 1 in water (a little Sodium Salicylate added will often 'clear' a strong solution). This solubility we find refers to the freshly made compound.

Flavoring—Glyl Lavandulæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Is diuretic, without affecting nervous system and causing sleeplessness. Safe for scarlatinal dropsy of children. In angina pectoris it lessens the frequency of attacks. Given for cough. In cardiac failure of granular kidney.—L. ii./08,519.

Tablets contain 5 grains.

The action of this body upon the renal secreting cells has been disputed—some say its diuretic effect is due to its power of causing dilatation of the renal vessels. It is said also to promote the elimination through the kidneys of common salt. Should be given in small dose—3 to 6 grains.—B.M.J. i./11,290.

Uropherin.—*Syn.* **Lithium-Diuretin.**

$C_7H_7LiN_4O_2 + C_6H_4(OH)COOLi$ = 330·086. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

A white powder soluble 1 in 5 of water. A diuretic with little action on the heart.

Iodo-theobromine. (*Syn.* **Theobromine Sodium-Iodo-Salicylate**).

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

White powder, containing about 40% theobromine with 22% sodium iodide and 38% sodium salicylate, soluble in water, is a good diuretic and heart stimulant, increasing blood pressure. In cirrhosis of the liver and acute nephritis.

Theobromine-Sodio Sodium Iodide. *Syn.* *EUSTENIN (T.M. 304580). $C_7H_7N_4O_2.NaNaI$=352·051.

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

In arteriosclerosis, angina and aortic aneurism.—B.M.J. i./09,542.

Aniso-theobromine. $C_7H_7N_4O_2Na.C_6H_4.OCH_3.COONa$=376·227.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) (?)

A combination of Theobromine Sodium and Sodium Anisate. Stated to have advantages over Theobromine-Sodium Salicylate.—F.N. 1909.

✱**Euphyllin** (T.M. 306214). PRIMARY AND SECONDARY THEOPHYLLIN ETHYLENDIAMIN in equal proportions.

Dose.—6 grains (**0·4 Gm.**) in 25 minims of water, intramuscularly.
$(CH_2NH_2)_2.C_7H_8N_4O_2+(CH_2NH_2-C_7H_8N_4O_2)_2=660·605$.

White crystalline powder easily soluble in water. Intramuscular injection acts as diuretic in uræmia.

Suppositories containing 5 grains, or **Enemata** containing 8 grains, are stated to be even preferable to above.—M. '08,209.

Theophylline, DIMETHYL-XANTHINE. (Isomeric with Theobromine). $C_5H_2(CH_3)_2N_4O_2=180·139$. (*See also* p. 243.)

The synthesised alkaloid is known by the name of ✱THEOCIN. (T.M. 247465/1900. Renewed as from 1916).

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

Synthesis.—The British Patent No. 14,935 of 1902 lapsed in 1914. The German Patent is 138,444 and the U.S.A. 716,994 (1902).

Traubes' Method, on which the German patented method (138,444) is based, is outlined by P. May (Chemistry of Synthetic Drugs). Dimethyl-Urea is condensed with Cyanacetic Acid by means of Phosphorus Oxychloride and the resulting compound converted into the cyclic base (molecular rearrangement) by means of alkali. From this the iso-nitroso compound is prepared, which is reduced to the corresponding amine. This amine is converted into its formyl derivative by means of formic acid which loses H_2O and yields Theophylline when heated with alkali.

We have not tried the above process, but some preliminary work was conducted in our laboratories, using as starting point Dimethyl-Uric Acid (1·3). As an outcome of Fischer's work, it is known that this acid on treatment with Phosphorus Oxychloride produces Chloro-Theophylline and that this on reduction with Hydriodic Acid gives Theophylline.

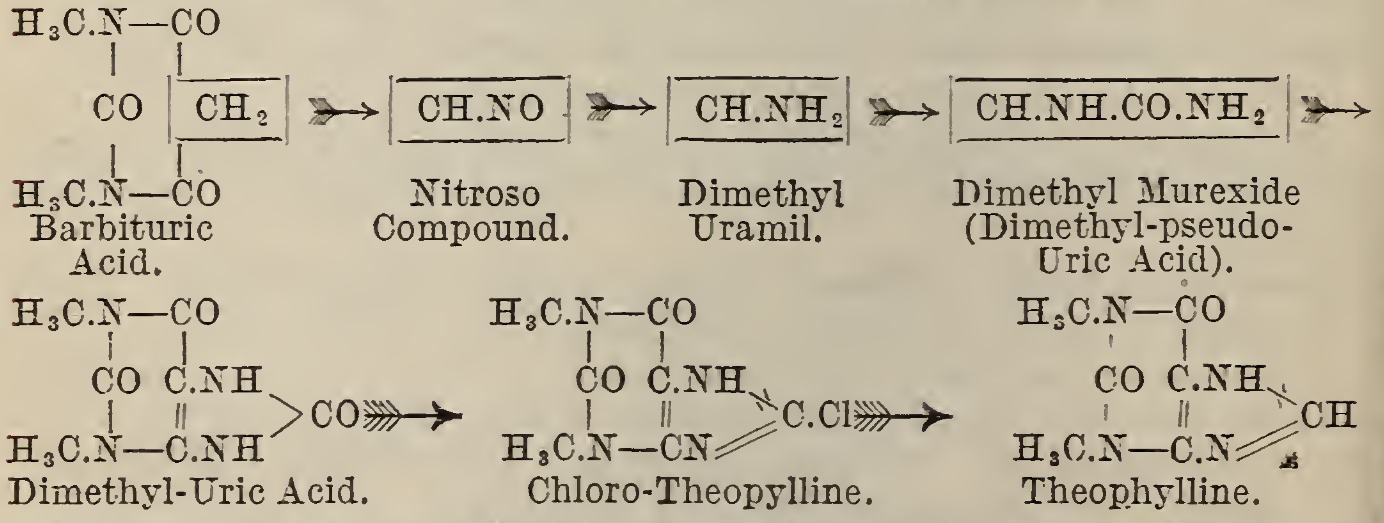
This 1 : 3 or γ-*Dimethyluric Acid,* according to Beilstein, is formed (together with Desoxyamilinic Acid) by shaking Methyl-Uric Acid with Methyl Iodide in the presence of Potash, using 1 Gm. Methyl-Uric Acid with 1 Cc. of N.KOH and 0·8 Gm. of Methyl Iodide (other methods are also given).

Attempts were made to introduce simultaneously the two methyl groupings required by using 2 molecular equivalents of Methyl Iodide and Potash, but they proved abortive. The experiments were made by heating with reflux condenser, by heating in a sealed vessel at 60° C. for upwards of three days in presence of Methyl Alcohol, and by heating in the presence of water.

In Fischer's paper—Berichte 28, 2475—he mentions making his γ-Dimethyl Uric Acid from Dimethyl pseudo-uric acid—which he obtains from Dimethyl Uramil, and this body he obtains from *Caffeine* !

As the methylation did not proceed readily, it seemed preferable to start from Barbituric Acid which was available commercially (*not* Diethyl-Barbituric Acid, which is of course Veronal). Barbituric Acid is Dimethyl-Malonyl-Urea. It is made by combining Dimethyl-Urea with Malonic Acid.

The steps are those of Fischer's Caffeine synthesis :—



For producing **Nitroso-Barbituric Acid** we used the strong Nitrous Acid of commerce—heat is required.

The reduction to **Dimethyl-Uramil** is conducted by heating with Hydriodic Acid.

To produce **Dimethyl-Murexide** it is directed to heat to boiling point Uramil 4 with Mercuric Oxide 3 and Water 120 with addition of a few drops of Ammonia. Filter hot: crystals are stated to throw out especially on addition of Ammonium Carbonate to the almost cooled solution.

To convert this into **Dimethyl-Uric Acid** it is directed to heat with Oxalic Acid.

To convert this into **Chlorotheophylline** Fischer (B. 28, 3138) directs the γ-Dimethyl Uric Acid 1 part to be finely powdered and heated in a *sealed tube* at 150° C. with Phosphorus Oxychloride 4 parts and Phosphorus Pentachloride 2 parts. Shake during the first hour. After about $\frac{3}{4}$ hour the bulk of the acid is dissolved and the liquid turns brown. Chlorotheophylline begins to crystallise out. After $2\frac{1}{2}$ hours separate the crystals from the mother liquor and wash with ether. Boil out the dark grey product with 10 parts of Absolute Alcohol to crystallise. Yield 45 to 50%. For further crystals use animal charcoal in slightly alkaline solution and precipitate from the filtrate with Hydrochloric Acid and finally recrystallise from Acetone. Melting point 300° C.

Conversion into Theophylline.—Warm the Chloro-Theophylline with Hydriodic Acid 8 parts, forming a brown liquid. To reduce the Iodine it is well to add powdered phosphonium iodide and to shake. The action is complete in 15 minutes—the completion is easily seen by the colour of the liquid. Evaporate on the water bath to dryness—this gives Theophylline Hydroiodide. To prepare the base dissolve in water, add ammonia to alkalinity and evaporate excess of the solvent. On cooling crystals are deposited. Filter and wash with a little ice cold water and recrystallise from 8 parts of hot water.

At the time of going to press we have not had opportunity to go further into the process on a manufacturing scale.

White crystalline powder, soluble 1 in 200 (by experiment) of cold water, and about 1 in 90 of Alcohol (90%). Marked diuretic.

Has been found useful in heart affections attended with symptoms of congestion, and nephritis with dropsy. **Tablets** weigh 4 grains.

Theophylline-Sodio Sodium Acetate (contracted to 'THEOPHYLLINE SODIUM ACETATE').

$C_5H(CH_3)_2N_4O_2Na.NaCH_3COO = 284{\cdot}285.$

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**) dissolved in water, three or four times daily after meals.

Flavoring.—Glyl Menthæ Piperitæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Nausea may be prevented by small doses of Menthol beforehand, *e.g.* $\frac{1}{10}$ grain in 15 minims of Tincture of Orange.

One of the Sodium atoms, it will be observed, is in chemical combination with the base—the compound is made on the lines of the analogous Theobromine Compounds (*vide antea*).

White flocculent powder—*Soluble* about 1 in 20. For œdema and dropsy of cardiac origin; seldom causes unpleasant effects. The action of the drug is enhanced by Digitalis. For excitable neuropathic individuals. Paraldehyde may be given simultaneously.

Theophylline Sodium Acetate Tablets—4 grains are prepared.

In epidemic nephritis among soldiers this drug appeared to act as a renal irritant as well as diuretic and unsuitable in acute cases. The same true of Diuretin. Hot air baths have definite limitations. Only useful if followed by diuresis. Low nitrogenous diet recommended during the acute stages bu t one containing variety.—Langdon Brown, L. ii./16,863.

Digitalis combined with Theocin. The addition of the latter to digitalis therapy in dropsy often "tips the balance" and makes the kidneys act. The combination has proved especially suitable when both heart and kidneys are diseased. The action is often very striking. Theocin Sodium Acetate may start its action within an hour. If no effect is manifested within 24 hours or after 40 grains it is of little use continuing the drug. Theocin appears to act more effectively after the patient has taken a sufficient amount of digitalis to affect the heart.—G. A. Sutherland, L. i./17,441.

THORIUM.

Th. = 232·4.

The discovery of the element Thorium is usually associated with the name of Berzelius (1845) *c.f.*, P.J.ii./12,580. Thorium occurs as Silicate in Thorite and Orangite in Norway.

It is obtained chiefly from Monazite Sand. This mineral contains about 4% Thorium Oxide.—Soddy. It occurs on the Brazilian Coasts—also in India, Ceylon, Straits Settlements, Carolina, Queensland and Southern Nigeria.

It is largely used in making **Gas Mantles.** Soddy states hundreds of tons of Thorium Salts are made from it annually for this purpose. The gas mantles are composed of 99% Thorium Oxide and 1% Cerium Oxide. For history and description of Incandescent Lighting, see C.D. ii./07,315.

Difficulty of extraction from Monazite due to the Thorium being associated with 10 to 12 times its weight of the cerite earths —E. White, P.J. ii./12,580.

We have had occasion to prepare the following Salts and Compounds of the Element, which by reason of their radioactivity, relatively slight in comparison with Radium it is true, have found therapeutic utility. The degradation products of Thorium, Mesothorium, Radio-Thorium and Thorium 'X' have recently attracted interest in view of the scarcity of Radium.

We deal with the 'ordinary' inorganic and organic compounds in this volume and have transferred the matter relating to the radio-active bodies and their disintegration products and their therapeutic use to Vol. II.

Thorium Oxide. $ThO_2=264·4$.

A heavy white powder insoluble in water and dilute acids.

Injectio Thorii Oxide.

A suspension of this substance which is stated to be inert and has been suggested for diagnostic purposes in "X" ray work, to replace Beck's Bismuth Paste which has occasionally given untoward poisoning result.—Glasgow, Med. Jl. lxxiv., p. 353. We have prepared a suspension of this nature using vaseline oil.

Thorii Hydroxidum, $Th(OH)_4=300·432$ of commerce occurs as heavy white lumps or powder practically insoluble in water.

Thorium Pads contain a convenient amount of thorium hydroxide, and are made to fit the part affected, *e.g.*, head, spine, &c. These pads are suggested for use in the treatment of nervous diseases.

Thorii Nitras.—$Th(NO_3)_4=480·44$ $(+4H_2O=552·504)$.

White crystals—usually in commerce with water of crystallisation. The most important Inorganic Thorium Salt. Apart from its use in the mantle industry is employed for producing Thorium 'X' and the Emanation Inhalation (*q.v.* Vol. II.)

Soluble in water 1 in less than 1; in Alcohol 1 in 5.

Exsiccated Salt is soluble to the extent of 2½ in 1 of water (by experiment, 1914).

Thorii Chloridum $ThCl_4+8H_2O=518{\cdot}368$, and **Thorii Sulphas** $Th(SO_4)_2 4H_2O=496{\cdot}584$.

White crystals—the former soluble in water—the latter slightly so.

Typhoid and paratyphoid and other intestinal affections well treated by Thorium Sulphate at the rate of 4 Gm. *pro die* either in form of 2% solution or in cachets. Effects said to be most marked.—Paris Medical, 1917, 7, 398 (Nov. 10th). See also Pres., Jan. 1918.

Organic Thorium Compounds.

The following organic salts have been prepared and are supplied under the brand ✱ "**Thoriac**" (T.M. 274176). The lactate and the sulpho-carbolate are soluble in water; the others being insoluble or only slightly soluble compounds, suggest themselves for external employment in the form of dusting powder, pigment, or ointment.

Uses.—It appears probable that the sulphocarbolate will be found of use in intractable skin diseases. The ointment prepared from the oleate has been found of great utility, either alone or in connection with other substances, *e.g.*, Copper Oleate, in old chronic psoriasis, eczema rubrum, and gouty eczema.—L. Drage. Also in boils and carbuncles well rubbed in it acts remarkably.—W. H. M.

Dose.—Although some of these compounds have not been tried therapeutically, we are of opinion that 1 to 5 grains could safely be given providing the effects be carefully watched, beginning with the smaller amount—compare recent large doses of the sulphate above.

Thorii Camphor-Sulphonas.

$Th(C_{10}H_{15}O.SO_3)_4,9H_2O=1319{\cdot}464$.

The camphor sulphonic acid necessary is prepared by acting upon 152 of camphor (in solution in acetic anhydride) with 98 of sulphuric acid, producing, theoretically, 232 of camphor-sulphonic acid. This quantity requires theoretically, 75 of thorium hydroxide for saturation. Well defined crystals.

Thorii Cinnamas. $(C_6H_5.CH:CH.COO)_4Th=820{\cdot}804$.

Thorium cinnamate is made by treating sodium cinnamate with thorium nitrate. It contains about 32% ThO_2. Insoluble in water.

Thorii Ortho-Coumaras.

$(C_6H_4OHCH:CH.CO.O)_4Th=884{\cdot}804$.

Prepared by double decomposition between thorium nitrate and sodium ortho-coumarate. A fine white powder, insoluble in water.

Thorii Aceto-Coumaras, *vide* **Tylmarin-Thorium,** p. 31.

Thorium Glycerophosphate, Phthalate and Camphorate.

Prepared by double decomposition. White powders.

Thorii Lactas.

$Th[CH_3.CH(OH).COO]_4,2H_2O=624{\cdot}652$.

By interaction of the freshly precipitated hydroxide with lactic acid. It is a crystalline soluble salt, but becomes basic and less soluble on keeping.

Thorii Oleas.

Thorium Hydroxide 300 will interact with approximately 1,120 of oleic acid. A little ether is added to dissolve the oleic acid. The salt is at first pasty, becoming hard ultimately. Suggested for use in the form of an ointment with paraffin basis for eczema.

Unguentum Thorii Oleatis (Drage). Contains 25% Thorium Oleate rubbed into a smooth cream with Almond Oil.

Used with marked success in old chronic psoriasis, eczema rubrum, gouty eczema, and in boils and carbuncles.

In our knowledge sycosis was cured with a few applications.

Thorii Quinas.

This is prepared by treating the hydroxide (freshly precipitated) with quinic acid. Scales are easily obtained. ***Soluble*** in water 1 in 1 easily, slightly in alcohol, 90%.

Thorii Salicylas.—This salt, made by precipitating thorium nitrate with sodium salicylate, is a basic one in form of white, insoluble powder apparently having the formula $(C_6H_4OH.COO)_2$ ThO=522·55. It contains 50% ThO_2.

Thorii Sulphocarbolas. *Syn.* THORIUM *p*-PHENYL-SULPHONATE.
$Th(C_6H_4.SO_3.OH)_4,9H_2O=1087·064$.

A well-defined crystalline salt with pinkish shade of colour. Suggested as a radio-active antiseptic. Readily soluble in water and about 1 in 3 in alcohol 90%; but from both the solutions we find that separation shortly occurs owing apparently to dissociation.

Thorium-Sodium Citrate Solution as Pyelographic Medium.

The solutions used contain the equivalent of 10 per cent. and 15 per cent. Thorium Nitrate.

To make 100 Cc. of a 10% solution, 10 Gm. of Thorium Nitrate are dissolved in as little distilled water as possible. To this solution, kept hot on a water-bath, add 30 Cc. of 50% Sodium Citrate Solution in small quantities at a time with shaking. At first a precipitate forms which dissolves when all the citrate solution is added. Make neutral to litmus with N/1 Sodium Hydroxide Solution, and dilute to 100 Cc. with distilled water. Filter and sterilise. (Will stand boiling.)

A 15% solution is prepared in similar manner using the required increased quantities of ingredients, but we find it necessary to use the Soda solution stronger than N/1 in this case.

The solutions contain the double Citrate of Thorium and Sodium together with excess of Sodium Citrate and some Sodium Nitrate.

Uses.—"This solution is stated to fulfil all the conditions necessary for an ideal pyelographic medium. It is not irritating to mucous membranes and peritoneal surfaces, does not precipitate salts in the urine, and can be injected intravenously up to 1·5 Cc. per kilo of body weight and given by stomach up to 4 Cc. per kilo of body weight in dogs without causing any change in the phenolsulphonephthalein output, blood urea content, hæmoglobin content, or cellular elements of the blood. It is opaque to X-rays. Clinically, there was no evidence of toxicity in a series of 125 cases, the amounts used in a single case varying from a few Cc. to almost a litre. Experimentally, although in a few instances death has followed the injection of large doses into the peritoneal cavity and tissue of animals, larger doses intraperitoneally and intravenously have produced no ill-effects. That the solution is non-irritating is shown by the absence of urinary symptoms after its use, and the absolute lack of any such evidence cystoscopically, and at operation. The pyelograms and cystograms made with this solution show a good shadow which possesses clearness of delineation. The solution is clear and watery, therefore it possesses a great degree of fluidity, permitting its ready elimination from the urinary tract. It is perfectly clean and does not stain the linen. In this particular it possesses another marked advantage over other solutions, particularly those of the silver salts. It is quite inexpensive, being about one-third as costly as collargol."—J. E. Burns, Bulletin of Johns Hopkins Hospital, Baltimore, Jl. of the Am. Med. Assn., June 1916, XXVII, No. 304 pp. 157–192. See also Preliminary Report, June 1915.

Further experience justifies belief in suitability of the preparation. 185 cases during the year without untoward effects being observed. As much as 600 Cc. of the 10% solution have been used in the entire urinary tract at one time.

For pyelograms from 5 to 150 Cc. of the 15% solution have been used and for cystograms almost a litre (quart) of the 10% solution.

To introduce the solution use a burette with a rubber tubing connection and a properly fitting nozzle for the end of the urethral catheter, the burette being held slightly above the level of the patient, and allow the solution to run in by gravity until the patient complains of a sensation of fulness in either kidney region. The exposure of the Roentgen ray is then made, the solution being allowed to flow into the renal pelvis during the exposure. Injection with a syringe is not advised.—J. E. Burns, Jl. A.M.A., Jan. to June, 1917, pp. 533, 877, 1875.

For the Radioactive Disintegration Products of Thorium, see Vol. II.

THYMOL.

$C_6H_3(CH_3)(OH)C_3H_7$,1 : 3 : 4,=150·162.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**), in pills with soap and a trace of Alcohol, or in oilly or aqueous solution. Anthelmintic. *Dose* 15 to 30 grains (**1 to 2 Gm.**).—*Off.*

A Phenol obtained from the oils of *Thymus vulgaris, Monarda punctata,* (*Labiatæ*) and *Carum copticum—Umbelliferæ.* The oil of the last mentioned is *Off.* as Oleum Ajowan[*] with not less than 40% Thymol. *Oleum Thymi* is official in U.S., and assayed to contain 20% phenols.

Monarda Punctata Oil contains 60% Thymol as against 45 to 50% in oil of Ajowan from India. *Origanum hirtum* growing in Crete and Dalmatian coast contains 60–67%. *Mosla Japonica* 44%. Wild Thyme of France 20% —P.J. i./15,114. It is produced on a commercial scale from Oil of Ajowan Seed.—D. Hooper, P.J. ii./16,49.

Thymol is in large transparent crystals melting at 111° F., having the odour of thyme and a burning taste.

Soluble 1 in 1,500 of water, 1 in 200 of glycerin, 1 in 8 of alcohol and glycerin, equal parts ; soluble in fats and oils, and 8 in 3 of alcohol 90%, and freely soluble in ether, acetic acid and caustic alkalis. Liquefies Menthol, Chloral Hydrate, Camphor and Phenol.

Uses.—Externally a powerful antiparasitic also for certain stages of eczema and psoriasis (*see* Unguentum) and for burns (*see* Volckmann's solution). Internally as a vermifuge (especially for ankylostomiasis* and for nematoid worms) 10 to 30 grains, followed by a purgative. A powerful antiseptic. (Our experiments prove this *c.f. Antiseptic Powers, Vol. II.*). It is also a good deodorant. May colour the urine green. The administration simultaneously with or immediately after a large dose of a solvent of thymol, *e.g.*, alcohol, should be avoided. May be inhaled (*see* Vapor).

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[*] **Omam.**—*Syn.* **Ajowan.** The drug is given in the dose of 10 to 30 grains (0·6 to 2 Gm.) as Extractum Ptychotis Liquidum P.I.

Aqua Ptychotis P.I. (Omam water) made by distillation with the fruit is given in the dose of 1 or 2 ounces (30 to 60 Cc.). The dose of the volatile oil is 1 to 3 minims (0·05 to 0·2 Cc.).—N. S. D.

For mode of infection, details of the parasite and further notes on treatment of ankylostomiasis, vide Vol. II.

Used in diabetes and catarrh of the bladder in ½ to 1½ grain doses.

Tænia.—One or two doses of 5 grains in the early morning with a tumblerful of water generally causes tapeworm to be passed in a stool in the evening.—George V. Perez, B.M.J. ii./13,49.

Goitre—recent cases treated by 10 grain doses twice daily. Patient's dietary should contain no solvent of Thymol. With this rule no ill effects even after three months. Give as coarse powder and wash down with draught of water. In some cases swellings in the neck disappear rapidly. β Naphthol also beneficial. Maj. McCarrison regards the action of Thymol in goitre as very strong, though not conclusive evidence that the habitat in man of the organism responsible for the production of goitre is the intestinal tract. The action is a local one on the gut. The drug acts by destroying the living excitant of goitre or by reducing its activity or numbers so that the production of toxic substances is lessened and the thyroid is relieved of the excessive demand for secretion which necessitated the hypertrophy.—L. i./13,368 ; L. ii./06,1574 ; and Therap. Index.

Tuberculous abscesses treated by injections of Thymol 1, Camphor 2, Ether 3.—L. i./10,637.

For ***skin sterilisation.*** A 5% Alcoholic Solution of Thymol has been used in the place of Iodine Tincture (*q.v.*) prior to

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***Ankylostomiasis.** (*See also Vol. II.*).

Male Fern was found useless, Eucalyptus was too nauseating. Thymol and β.-Naphthol were both efficacious. β.-Naphthol was finally discarded in favour of Thymol (small doses are useless) owing to the discovery that β.-Naphthol may set up a fatal acute nephritis in persons whose kidneys are already diseased The drug treatment adopted was as follows :—*A purgative is taken at night, early in the morning half to one drachm of Thymol is taken, to be followed in two hours' time by another half to one drachm of Thymol, which in turn is followed in another two hours' time by a purgative.* The purgative recommended in Porto Rico is Sodium Sulphate.—L. i./11,717. *See* also *ibid*, p. 859.

Thymol 3 to 4 Gm. with Betanaphthol 3 Gm. efficacious.—H. B. Day, L. ii./14,82.

Exol.—A proprietary containing Thymol, Calomel and Santonin, in glutinous globules for ankylostomiasis.—L. i./14,184.

Betanaphthol in 30 grain doses (first thing in the morning) is likely to be more successful than Thymol. There is great difficulty in freeing the system from ova. Emulsion of Eucalyptus Oil 30 minims to the ounce as dose, also a mixture containing Bismuth Carbonate 30 grains and Thymol 30 grains for a dose taken first thing in the morning were tried.—L. ii./13,1117.

Thymol in ankylostoma anæmia. Workers on the cutting of the St. Gothard Tunnel received 12 Gm. in 12 hours (2 Gm. every 2 hours) in capsules without serious disturbance. Given with wine or some alcoholic mixture to dissolve some of the drug. The Thymol should be finely divided, *e.g.*, in fine powder with Milk Sugar.—J.A.M.A., June 8, 1912, per Glas. Med. Jl., Nov., 1912.

the commencement of the operation. Two applications are made with an interval of five minutes, three minutes after second application the operation may be started.—Pres., Nov., 1911, p. 287.

Thymol Disinfectant (*Martindale*).

This preparation was made during our investigation of the antiseptic power of Essential Oils (*q.v.*). It is one of the most potent antiseptics made, having a "*Lancet*" Carbolic Acid Coefficient of 10·4. It is employed as a general disinfectant and for instruments and in less strength for use to mucous membranes. For *Medical Purposes* a 0·1% (10 minims to the pint) dilution with water, forming a white emulsion, will have the same bactericidal power as a 1% Solution of Phenol. A stronger proportion than this (which would contain 1 of actual Thymol in 3,000) cannot well be tolerated by the mucous membrane—hence should be used with caution as it causes a temporary stinging sensation.

For *General Disinfection* a 1 in 200 (one tablespoonful to 5 pints).

Liquor Thymol. 1 in 800 of warm water.

This saturated aqueous solution is used diluted as an antiseptic gargle, but we agree with J. T. Hall, B.M.J. ii./17,99, that undiluted it is too strong. It "stings like mustard."

As a mouth wash found efficient by cultural experiments.—H. P. Goodrich, B.M.J. i./17,473.

Mistura-Oleo-Balsamica.—*Syn.* BALSAMUM VITÆ HOFFMANNI. 'Tincture of Life.' *Dose.*—1 to 4 drachms in water.

Oils of Lavender, Thyme, Lemon, Nutmeg and Orange Flowers of each 4; Oil of Cloves and Cinnamon 3½ of each; Balsam of Peru 10½; Alcohol 90% to 1,000; allow to stand a few days, then filter.

Is used in Africa as a remedy for snake bites. A carminative stimulant.

Ophthalmic Discs of Thymol contain $\frac{1}{1000}$ grain (0·000065 Gm.).

Pastilli Thymol contain $\frac{1}{32}$ grain.

Pigmentum Thymol.

Thymol 1, Ether 10, and Spirit 5, or Thymol 1, Petroleum Oil 18; used as pigments in ringworm of the scalp, whilst acting as parasiticides they dissolve the fat, loosen the hairs and thus help epilation. 2½ to 5% in a mixture of chloroform and olive oil also used.

Sapo Thymol St. G. H.

Thymol 1, Soft Soap 20 Alcohol to 40.

Thymaglycine. (*Martindale. Dose, per os.* 10 to 30 minims (0·6 to 2 Cc.).

A preparation containing Sodium Benzoate 3, Glycerin 10, and Thymol Water 50%.

As such, or diluted is beneficial in rhinitis, pharyngitis, quinsy, to brush the gums, and in gastric and intestinal catarrh.

For spraying into the throat and nostrils, may be diluted 1 to 3 with water. For **vaginal irrigation** dilute with 20 times its volume or less of water. Colitis treated with an irrigation diluted 1 in 6.—L. i./07,1642.

To ward off colds douche the nose with Thymaglycine as such or diluted 1 to 3 of water. This will create immunity.—L. ii./08,1661.

Secondary parotitis may occur, due to an ascending infection, in cases of gastric ulcer. Importance of antiseptic mouth washes.—B.M.J. i./09,1296.

As a preventive against microbic infection—notably as anti-rheumatic treatment, it is most important to wash the nasal mucous membrane and the throat (tonsils in particular) with an antiseptic lotion.—W. P. S. Branson, B.M.J. ii./12,1429.

In measles the necessity of wiping out the mouth with a preparation of this kind is often forgotten.—B.M.J. ii./13,673.

Colitis in children. 5 to 10 drop doses in paraffin or water well tolerated and effectual. It also acts well against threadworms and has been found of great value in whooping cough.—Lovell Drage.

✱**Glycothymoline** (T.M. 231933).. A proprietary article employed in catarrhal conditions of the mucous membrane of the nose, throat, stomach, intestine, uterus and vagina. Said to consist of Potassium Carbonate, Sodium Benzoate, Sodium Borate, smaller portions of Sodium Salicylate, Thymol, Menthol, Glycerin, and Alcohol, coloured with Cochineal.—Apoth. Zeitung. '07,167; Am. Jl. Ph., June, '07,277.

The antiseptic power of Thymol is thought to be hindered by the presence of glycerin in preparations of this kind—*c.f.* Glycerin Antiseptic Power, *Vol. II.*

Spiritus Thymol.

Dose.—3 to 15 minims (0·2 to 1 Cc.).

Thymol 1, Alcohol (90%) to 10; for medicating the wool of respirators. In scabies, where the infection is limited and recent, this solution is suitable for short applications.

Volckmann's Thymol Solution.

Thymol 1, Alcohol 20, Glycerin 20. Dissolve and add to water 1,000. Used as a spray and antiseptic lotion, as for burns.

Unguentum Thymol.

L. H. has 20 grains to the ounce of Soft Paraffin. *Dissolved by heat.* Applied half strength to the skin keeps off gnats, &c. Used in the later stages of eczema and for other skin affections.

Thymol Wool, also **Gauze,** 5%, are used as antiseptic dressings.

The late Lord Lister's directions for charging gauze with Thymol,—the charging mixture being composed of Thymol 16, Resin 50 and Spermaceti 500 to be manipulated in a 'hot box.'—L. ii./13,1595.

Vapor Thymol, T.H.

Thymol 6 grains, Alcohol 90% 1 drachm, Light Magnesium Carbonate 3 grains, Water to 1 ounce. A teaspoonful to a pint of water at 140° F. for inhalation. Stimulant and antiseptic.

Thymol Carbonate.—*Syn.* **Thymotal.**

Dose.—5 to 15 grains (0·3 to 1 Gm.).

A nearly tasteless, colourless, crystalline powder. Is not dissolved by the stomach and therefore proves valuable as a remedy for *Ankylostomum duodenale,* common in Italy. May prove useful in obstinate cases of tænia and other intestinal worms. **Tablets** contain 10 grains.

Thymoform Tablets.

Dose.—One occasionally

Contain Thymol and Formic Aldehyde in a Cane Sugar basis as an antiseptic throat lozenge.

✱**Arhovin** (T.M. 280681).—Diphenylamin Ethylthymyl benzoate, $C_6H_4.C_{10}H_{13}.COO.C_2H_5.(C_6H_5)_2NH=451{\cdot}429$. *Dose.*—4 minims in capsules.

In gonorrhœa also used as bougies, 0·01 to 0·05 Gm. in each.

TINCTURÆ.

Tinctures are made by *percolating* the drug in more or less fine powder with the menstruum (usually alcohol) in a percolator, or by *macerating* in a closed vessel for a length of time with shaking.

We have proved experimentally that in many instances the same effects can be produced by a few hours maceration, as with the customarily prescribed 'seven days' or more.

Non-Alcoholic 'GLYCERIN,' or 'AQUEOUS' **Tinctures**.

Some of these are in occasional demand, but the alkaloidal ones can have little activity, unless a suitable acid can be used to ensure their solution. The **Glycetracta**, with which we have experimented, should replace them.

Ethereal Tinctures of certain drugs are made, *e.g.*, Belladonna, Capsicum, Iodine and Menthol.

For the **dispensing of resinous tinctures** in mixtures, **Mucilage of Acacia** yields satisfactory mixtures with most Tinctures except in the case of Tinct. Benzoini Co., Jalapæ, Myrrhæ, and Tolu. The Mucilage is best diluted with as much water as possible, and the tincture then added.

If **Salts** be present in the mixture the above rule applies, except in the case of Cannabis, where Tragacanth Mucilage should be used. Tincture Podophylli requires no suspending agent in the absence of salts, but if any be present Mucilage of Acacia is best used.

Tragacanth Mucilage answers well for suspending Tinct. Jalapæ and Myrrhæ, but is useless for Tinctura Benzoini Co., Quininæ and Tolu. For Tinct. Benzoini Co. and Tinct. Tolu, the two mucilages combined are best. In the case of a mixture containing 1 drachm of resinous tincture to the ounce, dilute 1 drachm of Mucilage of Acacia with as much water as possible, add the tincture, and lastly add the Mucilage of Tragacanth.

Tinctura Hydrastis, which in absence of salts requires no suspending agent, should have an addition of Mucilage of Tragacanth if salts be present.

Tinctura Lupuli and Tinctura Cimicifugæ require no addition either in presence or absence of salts.—P.J. i./03,706.

Total solids and ash from a number of B.P. Tinctures.—P.J. ii./07,738.

TRAGACANTHA (*Off.*).

Dose.—2 to 10 grains (**0·12** to **0·6 Gm.**) or more.

From *Astragalus gummifer* and some other species (*Leguminosæ*).

To detect acacia in tragacanth.—P.J. ii./04,453.

Gelanthum (**Unna's Jelly**).—E. L.

Heat in a steam bath Tragacanth 110 grains, Gum Acacia 30 grains, Gelatin 120 grains, and Distilled Water 10 ounces, for 4 hours;

press the paste through muslin, mix well and add Glycerin 6 drachms, heat again in a water bath for an hour, and add Thymol Water *q.s.* to 12 ounces.—Ph. Form. modified. A basis for various antiseptic applications for skin medication.

Glycerin of Tragacanth (*Off.* and B.P. 1898).

Tragacanth, in powder, 1, Glycerin 3. Mix, and add Water 1. Useful pill excipient. **Glucantha, (was in G.H.)** Tragacanth 240 grains, Water ½ ounce, Syrup of Glucose 2 ounces.

'Cremor-Sicc.' Preparations.—Desiccating Creams for application to the skin. A small portion rubbed on the part in a thin layer rapidly dries and forms a protective coating. The following medicaments can be incorporated in the basis:—

Adrenalin 0·1%, **Alum Acetate** 5%, **Argyrol** 2%, **Boric Acid** 5%, **B. Naphthol** 5%, **Cade Oil** 10%, **Capsicin** 2%, **Chrysarobin** 5%, **Cicatricine** 10%, P1 **Cocaine** 2%, **Collargol** 2%, **Ichthyol** 5 and 10%, **Ichthyol Resorcin** 5%, **Iodoform** 5%, **Lactic Acid** 5%, **Liquor Carbonis Detergens** 5%, **Lysoform** 10%, **Menthol** 5%, Ⓟ**Mercuric Chloride** 1 in 5,000, Ⓟ**Mercuric Oxide Yellow** 2%, Ⓟ**Opium** 5%, **Phenol** 2%, **Resorcin** 2 and 5%, **Salicylic Acid** 2 and 5%, **Sulphur** 10%, **Thorium Hydroxide** 10%, **Thymol** 0·1%, **Xeroform** 5%.

The basis contains 25% of **Zinc Oxide.**

Mucilago Tragacanthæ (*Off.* and B.P. 1898).

Dose.—1 drachm to 1 ounce (4 to 30 Cc.) or more.

Improved formula suggested by the writer:—

Alcohol (90%) 120 minims. Put in a 20-ounce dry bottle and add Tragacanth, in powder, 60 grains. Shake till evenly moistened and add Distilled Water *q.s.* to 10 ounces. Shake again quickly to make a uniform mucilage. This keeps much better than mucilage of acacia. One part to 3 of aqueous fluid will suspend heavy powders. *Vide* also resinous tinctures.

Spirit of Chloroform instead of spirit suggested.—'Abel Scholar,' C.D. i./16,102.

Mucilago Marantæ. *Dose.—Ad lib.*

Triturate Arrowroot 6 drachms with water 2 ounces to make a smooth paste and make up with boiling water to 1 pint. Heat until semi-transparent. Cool and add spirit of chloroform 2 drachms.

To suspend Bismuth and other suitable heavy medicaments this and a similar preparation of cornflour has been found useful. It will suspend bismuth salts in a proportion as high as 1 drachm to the ounce.—Cpl. Cattel, Dispenser R.A.M.C., ex C. & D.

Pulvis Tragacanthæ Compositus (*Off.*).

A mixture of Tragacanth, Gum Acacia, Starch, and Sugar.

Dose.—10 to 60 grains (0·6 to 4 Gm.). Is used as last preparation, 10 grains to 1 oz., specially useful for bismuth oxynitrate.

TRITURATIONS, U.S.

General Directions.—Take of the substance 1, Milk Sugar 9. Mix equal quantities first and triturate together, adding more milk sugar from time to time, until the whole is added, and an impalpable powder is produced for the apportionment of minute doses is more accurately effected. May be dispensed with other ingredients in either pills or powders or flavoured and coloured with Pulvis Rosæ Compositus, *q.v.* Triturations in U.S. are 1 in 10 unless otherwise stated; that of Elaterin is the only example provided. *Vide* Index for Triturations prepared and their doses.

Levigations are ***Strength in 50*** :—

P1 Levigatio Aconitinæ	*Dose* $\frac{1}{5}$ to $\frac{5}{6}$ grains.
P1 Levigatio Hyoscinæ Hydrobromidi ..	,, $\frac{1}{4}$,, $\frac{1}{2}$,,
P1 Levigatio Hyoscyaminæ..	,, $\frac{1}{2}$,, 1 ,,

TROCHISCI.

Lozenges are prepared with six different flavourings (*Off.*). Those with **Fruit Basis** are prepared with Black Currant paste, Sugar and Tragacanth, but are harder than the Fruit Lozenges of commerce—viz., Benzoic Acid ($\frac{1}{2}$ grain), Catechu (1 grain), Eucalyptus Gum (1 grain), Guaiacum Resin (3 grains), Extract of Krameria (1 grain), and ⓅExtract of Krameria (1 grain), combined with Cocaine Hydrochloride ($\frac{1}{20}$ grain).

Simple Basis.—Sugar 496, Gum Acacia 19½, Mucilage 35, Water *q.s.* Used in—Ipecacuanha ($\frac{1}{4}$ grain), Reduced Iron (1 grain), and Santonin (1 grain).

Rose Basis is as above, but with addition of Otto. Used in—Compound Bismuth (Carbonate 2 grains), Potassium Chlorate (3 grains), and Sodium Bicarbonate (3 grains)—the last mentioned not now *Off.*

Tolu Basis contains Tolu Tincture 10, Water 10, Sugar 482, Gum Acacia 19½, Mucilage 35½, Water *q s.* Used in Acid Tannic ($\frac{1}{2}$ grain), Phenol (Carbolic Acid),(1 grain), (B.P.,'98) ⓅMorphine(Hydrochloride $\frac{1}{32}$ grain). and ⓅMorphine Hydrochloride ($\frac{1}{32}$ grain), with Ipecacuanha ($\frac{1}{10}$ grain).

Orange (Tincture) is used to flavour Sulphur Lozenges (5 grains).

Lemon Juice with Sugar, Acacia and Tragacanth is used for Phenol Lozenges *Off.* ($\frac{1}{2}$ grain).

In the index those with 'R' have Rose basis; 'S' have Simple Sugar basis; 'T' have Tolu basis; 'G' have Gelatin basis, and are the commonly sold **Pastils** or **Jujubes** of oval or round shape (the latter are frequently "sugared"). *Vide* also **Pastilli Glycogelatin.**

UNGUENTA.

The principal **Ointment Bases** are:—**Lard, Benzoated Lard,** and **Lard** with **Oleic Acid** (for Alkaloids); **Paraffin, Soft** (**White** or **Yellow**), and **Hard Paraffin,** and their combination **Paraffin Ointment** (**White** or **Yellow**); and **Wool Fat** (and **Hydrous**).

In addition Combinations of **Almond Oil, Beeswax** (**Yellow** and **White**), **Camphor, Glycerin, Olive Oil, Spermaceti,** and **Prepared Suet** and **Benzoated Suet** are ordered.

Officially during the war numerous preparations in the British Pharmacopœia containing Lard, Suet, Olive Oil and the like were modified.—*c.f.* p. 774.

Unguentum Simplex (B.P., 1885) was composed of White Wax 2, Benzoated Lard 3, Almond Oil 3.

Palm Oil, Cocoanut Oil, Sodium Stearate are further suggestions for Ointment bases.—B.M.J. ii./11,161.

Goose Grease is quickly absorbed (*c.f.* Anserine Mulls). Lanolin alone is absorbed very slowly, more ready when mixed with olive oil. The addition of a little cedar wood oil to an ointment increases absorption.—Pres., July, 08,140.

Lard and Olive Oil are absorbed to the extent of about 15% after two minutes rubbing. Hydrous Wool Fat is absorbed 20% providing proper amount of water is present—the results were obtained by rubbing 10 grains on to a skin area of 20 sq. inches and scraping off with a razor and weighing the amount not absorbed.

A basis of **Hydrous Wool Fat and Glycerin of Starch** is largely absorbed. It is relatively non-greasy.

Lassar's Paste (*q.v.*) forms an excellent *Protective Ointment,* as also does a mixture of Hydrous Wool Fat 1 with Soft Paraffin 3.—B.M.J. ii./11,161.

Nucoline.—A white solid fat free from odour. M. pt. 25 to 26° C. It was found to be absorbed to extent of 15%. Resembles Cocoanut Oil and is of more uniform consistence. Suggested as ointment base.

Cocos White.—A cream coloured solid fat firmer than Nucoline. Melts easily, runs freely and is not sticky. M. pt. 27 to 28° C. As a stiffening agent for Soft Paraffin it was satisfactory in proportion to 50%. Not satisfactory with Zinc Oxide however.—R. B. Wild, B.M.J. ii./13,983.

***Resorbin** (T.M. 215946).—A proprietary penetrating Ointment for use in cutaneous affections. A cream is also made.

The Ointments of the B.P.—E. W. Lucas—C.D. i./12,262—for a brief Abstract see Unguentum Paraffini.

***Eucerin** (T.M. 297268, 297270) **Anhydrous.**—A mixture of 5 parts of Oxycholesterins from Wool Fat with 95 Paraffin Ointment. This with an equal quantity of Water gives 'Eucerin Purum' miscible with other salves, etc.—Gehe.

For other ointment bases *c.f.* Adeps Lanæ, Mulls, Mollin, etc.

URANIUM.

U=238·2.

Uranium is a constituent of **Pitchblende** (*v.* Radium Vol. II.) to the extent of 40 to 70%. **Carnotite** is a hydrated Potassium-Uranium-Vanadate, a yellow mineral found as specks in sandstone or as incrustation in the cracks of same in Western Colorado, is a source of Radium, *q.v.*

J. Volney Lewis, Determinative Mineralogy, 1913, p. 93, gives Calcium and Barium as additional constituents in Carnotite.

Uranii Acetas.—$UO_2(CH_3COO)_2,2H_2O=424{\cdot}30$.

Small yellow crystals with odour of Acetic Acid.

Employed principally in chemical analysis, *e.g.*, Estimation of Phosphoric Acid, *c.f. Vol. II.*

Luminosity of Uranium.

Metallic Uranium and its salts shaken in a bottle give brilliant yellowish-white glow. The luminosity can be maintained to such an extent by continued shaking that the label on the bottle can be read with ease, and the general illumination seen easily throughout a large room. The best way to see the glow is to bring the bottle sharply down on the palm of the hand. On repeating the experiment with compounds of Uranium, the Nitrate and Yellow Oxide showed the same effect, but to a very much smaller degree, whilst the Black Oxide and Sodium Uranate do not give it.—Na., Dec. 15/10,207.

The effect is due to oxidation of minute particles which are knocked off. The sparks in question will explode a mixture of Hydrogen and Oxygen or ignite Petrol for an engine.—Na., Jan. 1911,308.

Uranium-Calcium Phosphate (Hydrated). *Syn.* AUTUNITE (from Autun in France). $Ca(UO_2)_2(PO_4)_2$, $8H_2O$.—T. H. Hatch, Mineralogy, 1912, p. 201—202.

This yellow mineral has been used for irradiating diseased tissues. To determine utility exposure for three hours in the dark should provide visible radio-active effect on a photographic plate. It should produce a shadowgraph of a coin in 6 hours, if the coin be placed on the plate, then a piece of wood ½ inch thick and the mineral above it must contain at least 50% of the crystals in the matrix.

Rodent ulcer cured in five weeks after exposure for three hours a day *Directions for use.*—A piece of lint is placed over the ulcer and the minera rests in this for three hours a day, which after a week can be increased to 4 or 5 hours. If any dermatitis be produced leave off the treatment for two days and apply then for one hour, or two hours only for the first week, after which increase gradually. Cover the mineral with bandage or lint to prevent crystals being detached from the matrix.—L. i./11,660,766.

Chronic deafness treated by irradiation from Autunite introduced into the meatus in metal capsules containing 1 centigram.—L. ii./13, 1093.

Note.—**Uranium Copper Phosphate** is URANITE (*Syn.* Cupro-uranite or Torbernite. The crystals of this are vivid green, and are found in Cornwall. *c.f.*, L. J. Spencer, The World's Minerals. 1911, p. 179.

URANIUM 'X.'

Uranium Compounds (giving normally both α and β rays) may be separated by ether solution into uranium giving α rays only, and the small amount of uranium 'X,' giving β rays. There is a state of balance between the amount of uranium 'X' losing its activity and the amount that is regenerated. Uranium freed from U. 'X' gradually recovers its power of producing β radiation. Uranium *grows* Uranium 'X.' The latter may be made from a purified Uranium Salt which has been kept a few months since its preparation and has regenerated its full equilibrium quantity of U. 'X.' The activity of Uranium 'X' separated from Uranium steadily falls in geometrical progression to Half Value in 24·6 days, *i.e.*, its average life is 35·3 days.

It will be noted in the diagram in the Chapter on Radium, *Vol. II.*, that two α particles are expelled at each atomic disintegration of Uranium. The element Uranium in fact has this distinctive feature amongst known substances expelling α rays. The two α particles are expelled at slightly different initial velocities—they are thought to be driven off *successively.* In other words, Uranium is really two bodies and not a single element. The first (with Atomic Weight 238·5) has been termed Uranium I. and the second (with Atomic Weight 234·5) is known as Uranium II. Its period of life is probably 2×10^9 years.—F. Soddy.

For the further consideration of **Radio-activity of Uranium** and its disintegration products, *vide* Atomic Disintegration in Radium Chapter, *Vol. II.*

Uranii Nitras $[UO_2](NO_3)_2 + 6H_2O = 502{\cdot}316$.

Dose.—½ to 5 grains (**0·03 to 0·3 Gm.**) after meals.

Lemon-yellow prismatic crystals. Soluble in water 2 in 1. Taste astringent. Internally with good effect in diabetes, also 2% as throat spray, with caution. Use in tropics.—B.M.J. ii./07,1061.

Tablets, 1 grain (0·06 Gm.) are prepared.

In psoriasis and senile atrophy of the skin, lotion of this salt 20 grains to the ounce useful and Uranium Oxide Ointment (*q.v.*).—A. Clark, B.M.J. ii./12,716. *See* also **Iontophoresis.**

Uranium Oxide occurs in 2 forms :—

(1). Uranous Oxide. *Syn.* Uranium Dioxide $UO_2=270·2$. A black powder soluble in Nitric Acid.

(2). Uranic Oxide. *Syn.* Uranium Trioxide $UO_3=286·2$. Orange yellow coloured powder soluble in mineral acids.

Uranium Trioxide as dusting powder in a recurrent case of carcinoma after surgical treatment. In lupus erythema as ointment 1 to 3 of Lanolin. Also 15 grains of the yellow Oxide in Sterile Oil injected into the substance of malignant growths. With the last-mentioned the tumour disappeared in a few months, hæmoptysis ceased, nodules disappeared. 'X' radiations (2H) to ulcerated patches with silver foil screen to accelerate superficial healing.—A. Clark, B.M.J. ii./12,716.

Experimental nephritis produced by Uranium Nitrate.—L. i./14,1453

Uranii et Quininæ Chloridum.

Dose.—3 to 6 grains (0·2 to 0·4 Gm.) thrice daily.

Yellow crystals, soluble 1 in 100 of water. For diabetes and gout.

Uranii Oleas. *Dose.*—½ to 5 grains, *vide* Oleata.

Uranii Salicylas. *Dose.*—5 to 20 grains (0·3 to 1·2 Gm.).

In reddish powder, is better tolerated than the nitrate.

Acidum Molybdicum $H_2MoO_4=162·016$.

May be prepared by precipitating from a solution of a Molybdate, *e.g.*, Sodium Molybdate with Hydrochloric Acid. It is soluble in excess of the Acid. White crystalline powder. Its employment is chiefly technical and analytical. Sodium Molybdate is contained in Fröhde's Reagent, *q.v.* used for testing for Alkaloids.

UREA.

$CO(NH_2)_2=60·057$. *Syn.* CARBAMIDE.

Dose.—10 to 60 grains (0·6 to 4·0 Gm.), thrice daily, may be given in a mixture flavoured with lemon syrup. Hypodermically similar amount in sterile water. It forms colourless crystals.

Soluble 1 in 1 of water and in alcohol 90% about 1 in 7½.

Urea is synthesised by acting on Phenyl Carbonate [$CO(O.C_6H_5)_2=214·08$ with Ammonia, the products of the reaction being Urea and Phenol] (Phenyl Carbonate is made by passing Phosgene, *i.e.*, Carbonyl Chloride * into dilute Sodium Phenate solution). Wohler in the year 1828 succeeded in converting Ammonium Cyanate into Urea; it was the first animal product made by a purely chemical synthesis.

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* **Carbonyl Chloride** *Syn.* **Phosgene,** $COCl_2$ = 98·925.

A colourless gas with penetrating odour decomposed by water into hydrochloric acid and carbon dioxide.

Manufacture.—By warming a mixture of Potassium Dichromate 400 and Sulphuric Acid 3,200 in a vessel with reflux condenser and dropping in Chloroform 160 in small quantities at a time.

It may also be obtained from Calcium Cyanamide by hydrolysing with 10% H_2SO_4 at 50° C.—P.J. i./16,45.

Uses.—Was first used as an antiperiodic and febrifuge in cases of ague. Subsequently as a diuretic in gout and kidney disease, and for phthisis.

It has marked bactericidal properties and has been suggested for use to wounds, *q.v.*

For the estimation of urea in urine *see Vol. II.*

Thio - Urea. *Syn.* **Thiocarbamide** $CS(NH)_2 = 74{\cdot}101$. Obtained by heating dry Ammonium Sulphocyanide in an enamelled vessel until a yellowish froth forms and Ammonia, Carbon Bisulphide and Sulphuretted Hydrogen begin to evolve, then cool rapidly and extract the unaltered Sulphocyanide with cold strong Alcohol and crystallise the residue repeatedly from hot water. Crystals soluble 1 in 10 in water—with difficulty in Alcohol.—Schmidt.

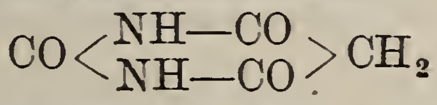
P1 **Ureides.**—The substances in the designation ***"All Poisonous Uriedes"*** in the Order in Council leave uncertainty as to what are included. An Ureide is a compound of an Acyl (or Acidyl) radical with the residue of Urea thus :—

$NH_2CO.NH_2$	$NH_2CO.NH.CO.CH_3$
Urea.	Ureide of Acetic Acid.

Analogous are the Amides to Ammonia :—

NH_3	$NH_2.CO.CH_3$
Ammonia.	Amide of Acetic Acid.

When the Acyl radical is from a dibasic acid one H atom of each NH_2 may be replaced as in Barbituric Acid.

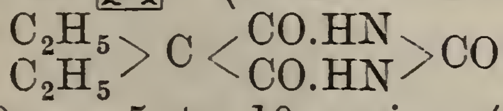


$$CO\left<\begin{matrix}NH—CO\\NH—CO\end{matrix}\right>CH_2$$

These are **Diureides** or **Cyclic Ureides.** Some hold that only these are included in the resolution. **Adalin** and **Bromural** are Ureides but not cyclic. Whether they are now in the Schedule depends on whether they are included by the adjective 'Poisonous' but ***N.B. Any Alkyl, Acyl or Metallic Derivative of Barbituric Acid is included*** in the Order, ***even if proved to be non-poisonous.***—B.M.J. i./13,836.

P1 **Barbitonum** (*Off.*).—MALONUREA. *Syn.* DIETHYL-MALONYL-UREA. DIETHYL-BARBITURIC ACID, P.G.V., P. HELV., P. SVEC. MALONAL. ✱HYPNOGEN (T.M. 279688), DEBA, VERONAL (Was T.M. 251242/1903. See details on Register.)

Wholesale and retail vendors must label poison and treat otherwise as P1. (*Part I Poison since January,* 1918.)



$$\begin{matrix}C_2H_5\\C_2H_5\end{matrix}>C<\begin{matrix}CO.HN\\CO.HN\end{matrix}>CO \text{ or } C_8H_{12}N_2O_3=184{\cdot}156.$$

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**)—should be dissolved in hot water. *Bowels should be kept open and the kidneys in good working order.* P.G.V. Max. single dose **0·75 Gm.** (12 grains); max. per diem **1·5 Gm.** (24 grains).

Caution.—5 grains are sufficient for an ordinary case of insomnia.

The symptoms of poisoning are—somnolence, unconsciousness, subsequently coma, cyanosis, cold extremities. 50 grains might be regarded as the average minimum fatal dose.—B.M.J. ii./13,1178.

This substance is no longer a British Patent. Numerous patents have been granted for making it, *e.g.*, 1664/1903, for the revocation of which an application was made in 1911 under Sec. 27 of the Patents and Designs Act, 1907, on the ground that the patent was only being worked outside the United Kingdom. The patent expired before the hearing came on. Another patent 14,014/1904, was however, revoked under this section. Further details.—C.D. May 15/15.

Manufactured by condensing Urea with the Diethyl ester of Malonic Acid as follows:—

The main reaction to be effected, according to the Patent Specification 1664 of 1903, is a condensation of Diethyl-Malonyl-diethylate with Sodium Ethylate and Urea. This could be indicated by the following equation:

$$(C_2H_5)_2.C.(COOC_2H_5)_2 + 2C_2H_5O.Na + CO(NH_2)_2 = (C_2H_5)_2C.(CONaN)_2CO + 4C_2H_5OH.$$

Malonic Acid is $CH_2(COOH)_2$.

From the patent example we take the following: Dissolve Sodium 32 in Absolute Alcohol 600 (weight), and after cooling add Diethyl Malonic Ethyl ester 100 (weight) and Urea in fine powder 40. Dissolve with gentle heating. The formation of Sodium Diethyl Barbiturate commences after a short time, but it is better to heat in an autoclave to 100–110° C. for 4 to 5 hours. During the process the Sodium Compound is precipitated mixed with a little Sodium Carbonate. After cooling the whole is filtered. The alcoholic mother liquor after again heating to the same temperature yields a further supply of the same product. Both yields are dissolved in water and decomposed by Hydrochloric Acid. The acid body is recrystallised from hot water.

Dorvault states Veronal is obtained by warming on the water bath 9 parts Diethyl Malonic Acid with 6 parts of Urea and 6 parts of Phosphorus Oxychloride. Hydrochloric Acid is evolved and Phosphoric Acid is formed. Wash with a little cold water and crystallise the residue from boiling water.

For either method it will be seen that Diethyl Malonic Acid is required; in the first method in the form of the Diethylate. The acid is in fact made from its ethyl ester.

Diethyl Malonate is prepared by dissolving Monochloracetic Acid 50 Gm. in water 100 Cc., neutralising with Potassium Carbonate 38 Gm., adding Potassium Cyanide 38 Gm., and heating on a sand bath until reaction sets in. When the reaction is over evaporate rapidly with constant stirring until the thermometer registers 135° C. in the semi-liquid mass. Allow to cool, powder and introduce into a vessel with an upright condenser. Add two thirds of its weight of Absolute Alcohol and whilst heating on the water bath pass in dry Hydrochloric Acid gas for ten hours. Then cool and extract with Ether 150 Cc., shake the ethereal solution with a little dilute Potassium Carbonate solution, dehydrate with Calcium Chloride and distil. The Diethyl Malonate distils at 195° C.—J. B. Cohen, Practical Organic Chem., 1900.

DIETHYL MALONIC DIETHYL ESTER. Sodium Ethylate is formed by dissolving Sodium 5 Gm. in 50 Gm. Absolute Alcohol, and whilst still warm 16 Gm. Diethyl Malonate are added; after a while the whole goes solid, then 40 Gm. Ethyl Iodide are added, and when the mass completely dissolves it is heated on the water bath until the liquid ceases to be alkaline.

The Alcohol is distilled off in a brine bath, the ester is extracted by ether dehydrated with Calcium Chloride and distilled. Boiling point 223° C., Sp. Gr. 0·990.

This is the process for Monoethyl MalonicEsteras described in Cohen as modified, *i.e.*, double quantities of Sodium Ethylate and Ethyl Iodide. See also E. Fischer, Annalen der Chemie, 335 (1904), 334.

A white crystalline powder melting at 191° C., ***Soluble*** 1 in 145 water at 20° C., and about 1 in 9 of alcohol 90%, more soluble in hot water, and in alkaline solutions (*ergo* possible absorption in the intestines). In Ether, 1 in 10—by our experiments. Should dissolve in Sulphuric Acid without colouration and not cause colouration on shaking with Nitric Acid (organic impurities).—P.G.

Uses.—Has a soporific action indicated in nervous restlessness, insomnia and depression, for maniacs and in cardiac troubles. Does not affect temperature or respiration. May cause erythema. Produces sleep without subsequent depression.—Cushny, 192.

In insomnia arising from pain 4 grains may be usefully combined with Atropine Methyl Bromide $\frac{1}{64}$ grain.

P1 **Maloure**a **Tablets,** 5, 8 or 10 grains, or in Cachets. (*Caution* for dose *v.* above).

P1 **Suppositories** 4 to 8 grains (0·25 to 0·5 Gm.).

Poisoning Effects.

A case of gangrene of the skin follows a large dose of Veronal and Pyramidon.—L. ii./11,479.

Hemiplegia caused by Veronal in aged persons.—B.M.J. ii./10,375.

Veronal has the peculiar property of counteracting unpleasant effect of morphine.—L. ii./08,1223.

Veronal owes activity to Ethyl groupings—this body is more powerful than the corresponding Methyl Compound, whilst Proponal (*infra*) possesses the maximum activity in the group.—B.M.J. i./09,554.

The number of deaths from Veronal have been more in one year than from Patent Medicines in a century.—Parry, P.M.C.E., C.D. i./13,600.

Antidotes.

Stomach pump, lavage and enemata. Coffee, Strychnine, later diuretics.

Trevanion Case.—Patient must have taken 21 × 7½ grain Cachets within an hour. 150 grains were found on exhuming and examining remains. Could not have been taken accidentally.—P.J. i./13,77,148.

Tolerance to Veronal may be established in some cases. Treatment of acute Veronal poisoning. If *within* 4 *hours* of taking the drug repeated lavage of the stomach with warm water, then introduce through the stomach tube a pint of hot strong coffee with some milk in it and an ounce of Castor Oil.

If patient is seen 6 *hours or so after taking the drug* the poison has passed into the intestine, but rapid washing out of the stomach and giving coffee may still be advised, unless patient is *in extremis.* Other measures—cardiac stimulants (Strychnine 1/30 grain with Digitalin 1/100 grain every 4 hours) warm Normal Saline subcutaneously, rectal injection of 15 oz. of Normal Saline containing 4% Glucose. If much cyanosis Oxygen. If pulse feeble Oxygen should be passed through a wash bottle of Absolute Alcohol. If urine is not freely excreted give Caffeine hypodermically. The coma may last several days—feeding, therefore, necessary with warm milk and coffee every 4 hours—either by stomach or nasal tube carefully passed.—W. H. Willcox, L. ii./13,1178; Inter. Cong. Med., Aug., 1913.

Tests and Toxicological Analysis in case of Veronal Poisoning.—See Vol. II.; Org. Anal. Chart and Corroborative Tests.

Review of hypnotic drugs, Chloral bodies, Sulphone Compounds, Ureides, and other bodies with allied effects.—W. H. Wilcox, B.M.J. ii./13,661.

A case with recovery after 125 grains. Patient remained unconscious from March 8th until the 11th, when he was brought round by lavage with Potassium Permanganate Solution, Strychnine hypodermically 1/40 grain every six hours and rectal feeding.—L. i./13,917.

Veronal 92½ grains taken with poisoning symptoms by a retired prize-fighter. Recovery. Treatment hypodermically Strychnine and Digitalin, stomach pump, lavage with weak Sodium Bicarbonate (tube passed with difficulty after warming and oiling it). Half pint strong black coffee and 2 ozs. brandy passed in, later hypodermic injections of Camphor Liniment (20 minim injections) every ½ hour (latter valuable,—keeps the heart going and overdose is impossible) and more Strychnine.—B.M.J. i./13,280.

Effects of 56 grains taken to relieve headache. Recovery after 4 days.—G. Newton-Pitt, L. i./13,412.

Another case, non-fatal after taking 125 grains in one dose, according to the patient. Treatment, lavage with dilute Permanganate; Atropine Sulphate 1/50th grain hypodermically repeated twice within two hours. The stomach washing was probably useless as absorption had presumably already occurred, yet he returned to consciousness after four days.—B.M.J ii./13,20.

Veronal taken regularly produces grave disorders of the nervous system. In addition there is a deterioration of the moral sense as in Morphine and Cocaine habit, hence a reckless use of the drug may result.—B.M.J. i./13,566.

Veronal (*and Luminal*) RASHES.—Veronal should not be used in skin cases, especially of the bulbous type. Erythematous rash (in some areas it was sheet-like as result of coalescence) after Luminal, 3 grains a day.—G. Pernet, B.M.J. ii./13,312.

Veronal poisoning—fatal case. Recovery of the drug from tissues and urine.—B.M.J. i./14,853. A case of recovery from 125 grains *ibid.* 854, and after 35 grains *ibid.* 856, and after 100 grains *ibid.* 1015.

For several earlier references to poisoning by this hypnotic *vide* Edn. XV., p. 779.

$\boxed{P1}$ **Veronal-Sodium.** *Syn.* ✱**Medinal.** (T.M. 304403). $C_8H_{11}NaN_2O_3$ =206·148.

Dose.—5 to 10 grains in a little water, 3 to 4 hours after last meal. In most cases 5 grains is sufficient for an adult.

Wholesale and retail vendors must label "Poison" and treat otherwise as $\boxed{P1}$.

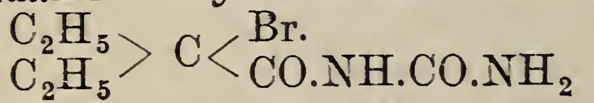
PATENT 19,411/1904 and 2566/1905 became void in 1913.

Manufacture.—Rub down Diethylbarbituric Acid 184 Gm. in a mortar with about 200 Cc. of water and then add Sodium Hydroxide pure 40 Gm. previously dissolved in water *q.s.* and *estimated.* It should be as free from CO_2 as possible. Evaporate to dryness on water bath. It is an interesting fact that this may be regarded as an acid salt. One would have expected a *Di*-Sodium compound. We found that, commencing with a proportion of alkali sufficient to make the Di-Sodium body, decomposition sets in on drying.

White crystals soluble 1 in 5 in cold water. Suitable for internal or rectal injection. Is stated to be useful in seasickness.

Hypnotic effect of Medinal is best obtained by the use of Suppositories medicated with 0·4—0·5 Gm. Administration by the mouth only on empty stomach.—Pres., 1910,210.

✱**Adalin.*** *Syn.* BROMODIETHYL-ACETYL-UREA, NYCTAL.



$$\begin{matrix}C_2H_5\\C_2H_5\end{matrix}\!>C<\!\begin{matrix}Br\\CO.NH.CO.NH_2\end{matrix}\quad=237{\cdot}079.$$

Patent 2888/1910. T.M. 325352 ("Adalin"). Suspended [under] 1914 Regulations.

Applications for the avoidance of the patent and T.M. were made by a firm in this country, Nov. 29, 1916. The mark is the name of a patented article—

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* Whether this compound is $\boxed{P1}$ or not depends on the meaning of the word "Poisonous" *c.f.*, Ureides, p. 753, and P.J. i./13,549; B.M.J. i./13,662,836.

C. D. March 15/13, p. 421, says it is not an ureide. It is regarded as an open chain compound, while it can be said to be not a derivative of diethylbarbituric acid. The same remarks apply to Bromural. C.D. says they cannot be designated poisonous. Our own opinion on the matter is that chemists should err on the side of caution.

this fact in itself was claimed to be sufficient ground for avoidance.—C.D. Dec. 2, 1916, and January 27, 1917.

Another British firm applied February 23rd, 1917, for license to use the patent, and suspension of the Trade Mark. The Patent Office Court recommended that a licence should be granted to both.—C.D. Jan. 27, 1917, and March 3, 1917, p. 215. Permission was received to use the Adalin Trade Mark.—C.D. Oct. 20, 1917.

We understand that both these firms are manufacturing in this country under licence.

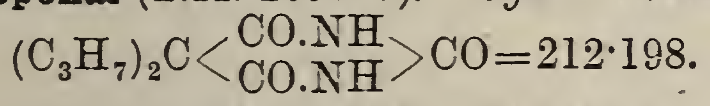
Dose.—As sedative 5 to 10 grains (**0·3 to 0·6 Gm.**) *t.d.s.*; as hypnotic 10 to 15 grains (**0·6 to 1·0 Gm.**) followed by hot drink half an hour before bedtime.

Tasteless crystalline powder. M.pt. 115°—116° C. Soluble 1 in 5,000 in water.—P.J. i./11, 404.

A hypnotic of medium strength. The cyclic structure of the urea derivative of Diethyl Malonic Acid (Veronal) according to E. Fischer makes it a much more powerful hypnotic than Diethyl Acetic Acid, of which Adalin may be looked upon as a derivative.—B.M.J. ii./13,48.

In functional and nervous diseases 0·25 to 1·5 Gm. As calmative 0·25 to 0·5 Gm. several times *per diem.* Small doses are of value in cardiac neurosis, the larger ones in convulsions. Sedative action more marked than the Bromides and slightly less than Codeine. After large dose deep sleep follows in ½ hour. Tablets, 5 grains each.—B.M.J.E. i./11,56; B.M.J.E. ii./11,48.

$\boxed{\text{P1}}$ ✱ **Proponal** (T.M: 269787). *Syn.*—DIPROPYL-BARBITURIC ACID.



$$(C_3H_7)_2C{<}\begin{matrix}CO.NH\\CO.NH\end{matrix}{>}CO=212{\cdot}198.$$

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

Wholesale and Retail Vendors must label "Poison" and treat otherwise as $\boxed{\text{P1}}$.

Manufacture.—Probably made under the Veronal patents (expired) but no licence was registered at the British Patent Office.—C. D.

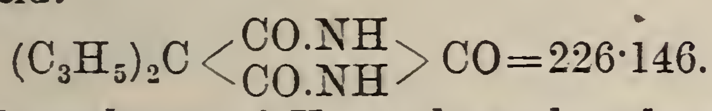
A homologue of Veronal in white crystalline powder, as hypnotic, very slightly soluble in water, more so in Alcohol. It is readily dissolved by alkalis—hence probably acts on reaching the intestinal fluids.—L. i./06,126; B.M.J.E. i./06,72. More rapid in some instances than Veronal.

$\boxed{\text{P1}}$ **Tablets** 1½ grains (**0·1 Gm.**).

Very narrow margin between therapeutic and toxic dose. *Whilst 5 to 6 grains are hypnotic, 7½ grains approximates danger zone.*—B.M.J. i./09,554.

Stated to be more poisonous than Veronal.—W. H. Willcox, L. ii./13,1180.

$\boxed{\text{P1}}$ ✱ **Dial** (T.M. 381421, Dial-Ciba T.M. 358,718). *Syn.* **Diallyl Barbituric Acid.**

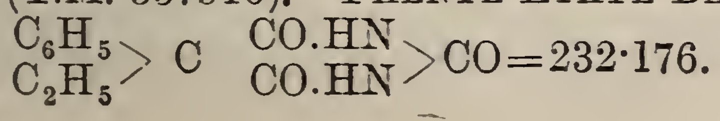


$$(C_3H_5)_2C{<}\begin{matrix}CO.NH\\CO.NH\end{matrix}{>}CO=226{\cdot}146.$$

A further homologue of Veronal employed as hypnotic. **Tablets** contain 1½ grains. Dose one half to three tablets in water.

Insomnia well treated by di-allyl-barbituric acid—a tablet on the tongue with a salt spoon of cognac emulsifies and is easily taken. Preferable to hypnotics. It is relatively assimilated while the diethyl compound is passed to the extent of 80% as such!—Watson Smith, P.J. i./18,219.

✱ $\boxed{\text{P1}}$ **Luminal** (T.M. 337916).—PHENYL-ETHYL-BARBITURIC ACID



$$\begin{matrix}C_6H_5\\C_2H_5\end{matrix}{>}C\quad\begin{matrix}CO.HN\\CO.HN\end{matrix}{>}CO=232{\cdot}176.$$

Wholesale and retail vendors must label "Poison" and treat otherwise as $\boxed{\text{P1}}$.

Dose.—In simple insomnia 1½ to 5 grains (**0·1 to 0·3 Gm.**) dissolved in hot water, where there is excitement 5 to 6 grains up to 12 grains (**0·8 Gm.**)—latter is *maximum dose.*

A modification of Veronal, an Ethyl group being replaced by a Phenyl radical hence the action is intensified. White powder with slight bitter state, almost insoluble in water.

Uses.—Hypnotic in conditions of excitement, in sleeplessness associated with pain, in mental conditions, etc. Bowels to be kept open and kidneys in good working order.

$\boxed{\text{P1}}$ **∗Luminal-Sodium.**—Readily soluble in cold water and is designed for hypodermic administration in alcoholic and mental cases.

Hypodermic Injection 20 per cent. is used.

Dose for men 2½ to 3 Cc. (=8 to 10 grains); for women 2 to 2½ Cc. (=6½ to 8 grains). The solution should be prepared with cooled boiled water, and may be kept for 1 to 2 weeks.

Luminal is more poisonous than Veronal.—W. H. Willcox, L. ii./13,1180.

∗Dormigene* (T.M. 367615). ∗BROMURAL (T.M. 284555). *Syn.*
α-Brom-iso-Valerianyl Urea.
$(CH_3)_2CH.CHBr.CO.NH.CONH_2 = 223{\cdot}058.$

PATENT 942/1907. On application by a British firm, June 21/16, is made in this country under licence. It may be prepared by condensing the chloride of α-Brom-iso-Valeric Acid with Urea:
$(CH_3)_2CH.CHBrCOCl + (NH_2)_2CO = (CH_3)_2CH.CHBrCO.NH.CO.NH_2 + HCl$

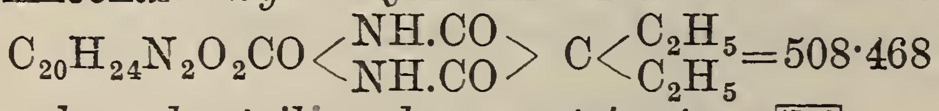
Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Colourless crystals, soluble with difficulty in water, dissolved by Caustic Soda and precipitated by acids from its solution in alkali. Melting point about 145° C. Contains about 36% Bromine. Is said to induce sleep which commences in from 5 to 25 minutes after taking and lasts from 4 to 5 hours, at the expiration of which natural sleep follows, the action of the drug having ceased in that time.—B.M.J.E. i./07,75.—B.M.J. i./09,554.—L. ii./08,1223.

Tablets contain 5 grains (**0·3 Gm.**).

This and Adalin cause a diminution in blood pressure, but are without effect on the heart,—experiments on rabbits. Adalin is the more lethal.—J.C.S.A. i./13,1023.

$\boxed{\text{P1}}$ **Chineonal.** *Syn.* QUININE DIETHYL BARBITURATE.



$$C_{20}H_{24}N_2O_2CO\begin{matrix}<NH.CO\\<NH.CO\end{matrix}\!>C\begin{matrix}<C_2H_5\\<C_2H_5\end{matrix}=508{\cdot}468$$

Wholesale and retail vendors must treat as $\boxed{\text{P1}}$.

Dose.—10 grains (**0·6 Gm.**) for adults.

Colourless crystals containing 63·78% of Quinine and 36·22% of Veronal. Soluble with difficulty in water but more readily in alcohol. M.pt. 132° C.

Uses.—As a general nerve sedative in fevers, neuralgia, etc. May also prove useful in sea-sickness. The combination of the two drugs is said to modify the after effects of Quinine.—M., 1913.

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* This is an Ureide and may be $\boxed{\text{P1}}$. *c.f.*, UREIDES, p. 753, and footnote to Adalin, p. 756.

P1 **Veronacetin.**—*N.B. Conditions of sale as for Veronal, q.v.*
A hypnotic and sedative stated to contain Sodium Diethylbarbiturate 0·3 Gm., Phenacetin 0·25 Gm., and Codeine Phosphate 0·025 Gm.—in two Tablets.—Münch. Med. Woch., 27/2/12.
✱ **Somnacetin** (T.M. 357367) is a similar preparation.—P.J. i./14,500.

URETHANE.

P1 *All "Poisonous" Urethanes*. Wholesale and retail vendors must label "Poison" and treat otherwise as* P1.

$CO(OC_2H_5)NH_2 = 89·081$. *Syn.*—**Ethyl Carbamate,** Fr. Cx. *Dose.*—10 to 60 grains (0·6 to 4 Gm.).

Colourless prismatic crystals, inodorous, with saline taste.

Manufacture.—By heating several hours in an autoclave or metal tubes, Urea Nitrate in excess of Absolute Alcohol at 120 to 130° C. and extracting first with water and this solution with Ether several times, Ammonium Nitrate is formed. Distil to rectify (B.pt. 180° C. without decomposition). $CO(NH_2)_2.HNO_3 + C_2H_5OH = NH_4NO_3 + CO(OC_2H_5)NH_2$—Bunte Zeit. f. Chem., A. 151,181.

Incompatible with Caustic Alkalis and with Acids. ***Soluble*** 1 in 2 of Water; 1 in 1 of Alcohol 90%. Fr. Cx. states 1 in 1 of Water and 1 in 0·6 of Alcohol (95%).

Uses.—Hypnotic, produces normal sleep, the heart is not affected; especially suitable for children; in cases of delirium tremens, and in acute mania and tetanus.

Tablets, 5 grains (0·3 Gm.).

Quinine Urethane (Hydrochloride). *Dose.*—½ to 3 grains (0·3 to 0·2 Gm.)

Employed hypodermically, as it is non-irritating.

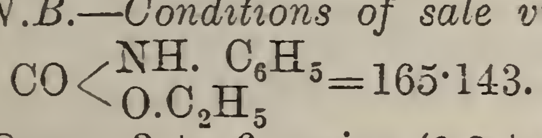
Is obtained by heating Quinine Hydrochloride 3 with Urethane 15 and Water 3 parts.—P.J. ii./02,273.

Urethane injected hypodermically into animals is said to produce complete insensibility to pain so that any operation can be performed with perfect safety. It is said not to cause heart failure or sickness.—From *The Times* per P.J. i./14, p. 393.

Malarial coma. The only treatment found of value was Quinine Hydrochloride 0·4 Gm. with Urethane 0·2 Gm. in 15 Cc. Normal Saline intravenously; also valuable for persistent fever and chronic forms of malaria. Painless. Intramuscularly not advised.—Richet and W. B. Griffin. B.M.J. i./17,190.

P1 **Phenyl-Urethane; Carbanilic Ether.** *Syn.* ✱Euphorine. (T.M. 98150).

N.B.—Conditions of sale vide Urethane.



$$CO<\begin{matrix}NH.\ C_6H_5\\ O.C_2H_5\end{matrix} = 165·143.$$

Dose.—3 to 6 grains (0·2 to 0·4 Gm.) thrice daily.

White crystals, slightly soluble in water, freely in alcohol.

Made by the action of Anilin on Chloro-formic Ethyl Ester. It has marked analgesic properties but is irregular in its antipyretic effect.—May. It has been used in acute rheumatism, neuralgia, orchitis, and headache.

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* There is vagueness in the wording of the Order in Council. The word '*poisonous*' leaves it to be decided in any given case whether a compound comes under the description or not.—B.M.J., i./13,836

VALERIANÆ RHIZOMA (*Off.*), U.S.

The dried rhizoma and roots of *Valeriana officinalis* and of *V. Wallichii* (V. Indica), (*Valerianaceæ*), collected in the autumn.

Fresh Juice of Valerian said to be the best preparation.—L. i./05, 1396. It contains 0·015% alkaloid.—L. i./07,900—and glucoside both unstable in composition, hence preparations should be recent.

Freshly gathered Valerian root shows the younger roots as almost colourless and nearly odourless. In commercial samples this difference can no longer be seen—all are dark colour—caused by a ferment, an oxidase. Fresh root further is practically devoid of smell. This is only developed during the process of drying under the influence of a ferment—the same or different from the one first mentioned. If the enzyme be killed by stabilising before drying, the root only develops a small degree of the typical odour. Either fresh Valerian or the stabilised article said to be best clinically.—Prof. van der Wielen, C.D. ii./16,911.

Extractum Valerianæ. *Dose.*—1 to 5 grains (0·06 to 0·3 Gm.). Prepared by concentrating the fluid extract.

Fluidextractum Valerianæ. U.S. VIII. 1=1 Hydro-alcoholic. *Average dose.*—30 minims (2 Cc.). Of brownish colour; represents the full activity of the drug.

Mistura Valerianæ Composita, R.F.H.—Tincture of Valerian 3, Fœtid Spirit of Ammonia 2, Camphor Water to 48.

Oleum Valerianæ. *Dose.*—1 to 5 minims (0·06 to 0·3 Cc.). Yellowish colour. Sp. Gr. 0·94. In flatulence and nerve complaints.

Tinctura Valerianæ Ammoniata (*Off.*). 1 in 5. *Dose.*—½ to 1 drachm (2 to 4 Cc.). U.S. 1 in 5 of Sal Volatile. Is of great value as an antispasmodic and nervine tonic for hysteria.

Off. has also now **Tinctura Valerianæ Indicæ Ammoniata** with same dose.

Flavoring.—Glyl Coriandri, Glyl Menthæ Piperitæ, Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum, Tinctura Carminativa. Tinctura Lavandulæ Composita.

Tinctura Valerianæ, U.S

Average dose.—1 drachm. 1 in 5 of a mixture of Alcohol (94·9% Vol.) and Water in proportion of 3 to 1.

Tinctura Valerianæ Ætherea. P. Austr. and **P. Helv.**—1 in 5 of Spiritus Ætheris.

Acidum Valerianicum, Fr. Cx., P. Helv. *Dose.*—1 to 5 minims (0·06 to 0·3 Cc.), in syrup or in gelatin capsules. Consists principally of optically inactive Isovalerianic Acid $(CH_3)_2-CH-CH_2-COOH$, with more or less dextrorotary Methyl-Ethyl Acetic Acid $(C_2H_5)(CH_3)-CH-COOH=102{\cdot}11$.

Manufacture.—Add gradually a mixture of Amyl Alcohol 1 (B.pt. 129—131° C.) and Sulphuric Acid 4 to a mixture of powdered Potassium Dichromate 5 and Water 4 in a retort with upright condenser. When reaction has subsided, heat to boiling until smell of iso-amylaldehyde is no longer noticeable. Then turn condenser down and distil. Neutralise distillate with soda and remove the iso-valerianic-iso-amyl ether which separates. Evaporate the clear solution to dryness, liberate the acid with sulphuric acid and re-distil.

An oily liquid, Sp. Gr. about 0·93. Has been employed in hysteria and nervous diseases.

Ferri Valerianas. $Fe_2(C_5H_9O_2)_2(OH)_4=381{\cdot}906$.

Dose.—3 to 15 grains (0·2 to 1 Gm.). A dark red insoluble powder, with valerian odour, astringent taste; prescribed in cachets. A nervine stimulant and emmenagogue, and is used in anæmia, hysteria and chorea.

Sodii Valerianas. $C_5H_9O_2Na=124{\cdot}097$.

Dose.—1 to 5 grains (0·06 to 0·3 Gm.).

In white crystals; used as a nervine sedative in hysteria and mania, N.H.W. has a mixture containing 3 grains, Tincture of Nux Vomica 3 minims, Tincture of Capsicum 4 minims, Water to ½ ounce.

Zinci Valerianas. ZINCI VALERAS, U.S.

$(C_4H_9COO)_2Zn=267{\cdot}564$. (*Off.* and U.S.$+2H_2O$).

Dose.—1 to 3 grains (0·06 to 0·2 Gm.).

White powder or in pearly crystals, very slightly soluble in water. Soluble in alcohol. Pills 3 grains each.

Nerve and general tonic, *e.g.*, after hay fever, and as prophylactic.

In hay fever the only drug with any beneficial effect—5 grain pill thrice daily or 1 grain with Pilula Galbani Composita 2 grains.—Tilley. For pruritus vulvæ sometimes of benefit.—B.M.J. i./12,472.

Incompatible.—Acids and metallic salts. (*See also* zinc salts.)

T.H. has a pill of 1 grain with Compound Pill of Asafetida 2 grains.

Amyl Valerianate. Iso-valerianic Iso-amyl Ester.

$C_5H_{11}.C_5H_9O_2=172{\cdot}21$. *Dose.*—2 to 5 minims (0·12 to 0·3 Cc.) in capsules or diluted in alcohol.

A mobile liquid, Specific Gravity 0·858. Miscible with Alcohol. Is employed as a sedative and antispasmodic. Has been recommended as gall-stone solvent. In trade is known as 'Apple Essence.'

Valerianic Diethylamide.

$CH_3.CH_2.CH_2.CH_2.CO.N(C_2H_5)_2 = 157{\cdot}207$. *Dose.* — 2 grains (0·12 Gm.). An oily liquid of a somewhat nauseous taste and odour.

Gelatin capsules contain 2 grains. As a substitute for valerian preparations in nervous and utero-genital affections.

Borneol-isovalerianate. *Syn.* HYSTEROL.

Manufacture.—May be prepared by distilling a mixture of Borneol 154 with Iso-valerianic Acid 85 in the presence of a small quantity of Sulphuric Acid or by condensation of Borneol 154 with Iso-valerianyl Chloride 120. (Iso-valerianyl Chloride is made by interaction of Iso-valerianic Acid 85 with Phosphorus Pentachloride 216).

Gelatin capsules contain 4 grains. A valerian substitute. In cardiac neurosis, hysteria, neurasthenia, etc. The action of Borneol is to diminish reflex irritability while valerianic acid acts as antispasmodic.

Best taken after meals to prevent eructations.

★ **Gynoval** (T.M. 263133), a similar Valerian Derivative in Gelatin Capsules. *Dose.*—1 capsule three or four times daily one hour after meals. In dysmenorrhœa, hysteria, etc.

Since the fresh juice owes its physiological properties to the undecomposed Bornyl Isovalerianate contained in the oil it would appear more desirable to use the oil itself.—P. R., Feb., 1911, p. 35.

Valérobromine. A specialty for use in nervous affections in 2 forms: '**Liquid.**' *Average Dose.*—2 to 6 drachms; **Capsules**

coated with gluten to dissolve in the intestine. *Average dose*—4 to 12 capsules *pro die.*

P1 ★ **Trivalin** (T.M. 340917).—*Dose per os* 8 minims (**0·5 Cc.**), *hypodermically* 8 to 15 minims (**$\frac{1}{2}$ to 1 Cc.**), ounce to 3 times daily.

A solution of Valerianic Acid with Morphine Valerianate 1/3 grain (0·02 Gm.), Caffeine Valerianate 1/18 grain (0·0037 Gm.), Cocaine Valerianate 1/12 grain (0·005 Gm.), in 1 Cc. Said to have the therapeutic effects of Morphine without disadvantages. Anodyne, *e.g.*, in painful dressings, inoperable cancer, gall-stone, colic, and neuralgia. As tonic in delirium, mania and hysteria.

P1 **Tablets** are made = $\frac{1}{2}$ Cc. of the above.

The combination is in the proportion of one molecule each Caffeine Valerianate and Cocaine Valerianate and 4 molecules Morphine Valerianate. Overlach made a study of the combination of drugs to bring out and intensify beneficial action of each.

P1 **Trivalin** is made in combination with **Hyoscine Valerianate** 1/115th grain (0·00056 Gm.) per Cc., for treatment of the insane. *Dose.*—0·25 to 0·5 Cc.

Commercial Valerianates estimated by distillation using Sodium Acid Sulphate. Menthyl Valerianate requires hydrolysis first.—H. D. Richmond and W. T. T Ainsworth B.P. Conf. 1919.

P1 VERATRINA (B.P. 1898). U.S.

Syn. Cevadinum, **Ph. Ned.**

Cevadine Cryst. has formula $C_{32}H_{49}NO_9 = 591{\cdot}562$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

A mixture of alkaloids, chiefly amorphous veratrine and crystalline Cevadine, from Cevadilla seeds—*Schœnocaulon* (*Asagræa*) *officinale* (*Liliaceæ*)—in greyish white masses; powerfully sternutatory; taste bitter and acrid. **Veratrine amorphe** Fr. Cx. is also a mixture of similar composition, method of preparation is given.—*Max. single dose* $\frac{1}{32}$ grain, max. during 24 hours $\frac{1}{6}$ grain approximately.

The seeds contain from 2·8 to 3·5% alkaloids.—Apoth. Zeit., 1913, 28,174; Y.B.P., 1913,31.

Nearly insoluble in water; *soluble* 1 in 3 of 90% alcohol; 1 in 6 of ether. It is used as an antipyretic *with caution*! and circulatory sedative in fevers and acute inflammations—resembles Aconitine in its general effects. Large doses cause vomiting and purging; sometimes for neuralgia, spasm, rheumatism and gout. Externally in the form of ointment for neuralgic pains and swellings. Internally and externally, recommended for pruritus.

Ⓟ **Oleatum Veratrinæ.**

Veratrine 2, Oleic Acid (by weight) 50, Olive Oil to 100. Useful for neuralgia. Stronger, *e.g.* 10% is employed as a pigment.

Ⓟ **Unguentum Veratrinæ** (B.P., '98).

Veratrine 1, Oleic Acid (by weight) 4 (1 grain=2 drops); warm gently to dissolve, add Lard 45. Prolonged use may produce rash. Useful for neuralgia and sciatica, rubbed in twice daily.

Ⓟ **Acetum Cevadillæ, E.**

Cevadilla Seeds crushed 10, Methylated Spirit 10, Acetic Acid 18, Water 72. Macerate 7 days. For external use.

The Germans employed Veratrine extracted from Cevadilla for use in tear shells.—G. Sharp, P.J. i./16,620.

* VESCETTES.

(T.M. 260597).

*Vescettes are effervescent Salts in compressed form. They are convenient and portable, contain an accurate proportion of the drug (for various formulæ see Index), and are directed to be crushed and added to a small quantity of water preferably warm—forming a palatable mode of administering drugs of unpleasant taste. Their effervescence aids assimilation and toleration.

ZINCUM.

$Zn=65{\cdot}37$.

To prepare **Arsenic-free** melt in a clay crucible and add about 15 grains of Sodium to a pound in small bits at intervals. Remove the scum, avoiding iron implements, and repeat in another clean crucible. Granulate by pouring into water when almost solidified.

Incompatibilities of Zinc Salts.—Alkaline carbonates, and alkalis in general, vegetable infusions and milk.

Antidotes.—Alkaline Carbonates in warm water, Demulcents, Milk and Egg, Tea and Tannin solutions.

Zinci Acetas.

$(CH_3COO)_2Zn.\ 3H_2O=237{\cdot}486$. *Off.* and U.S. have $2H_2O$.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**) as a nervine tonic, 10 grains for an emetic dose.

White crystals with faint acetous odour. Soluble in water 1 in 2·5, about 1 in 40 of alcohol 90%. Used as astringent lotion ($\frac{1}{4}$ to 1%).

Zinci Benzoas. $Zn(C_6H_5.COO)_2=307{\cdot}52$.

White powder, soluble in water. Examination of.—P.J. ii./13,686.

Zinci Bromidum, $ZnBr_2=225{\cdot}21$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) in water.

White deliquescent powder. A little dilute hydrobromic acid will make a clear solution. Incompatible with alkaloids and salts of heavy metals. Used with success in epilepsy. In *petit mal,* may prove efficacious where other bromides fail.—L. i./09,908.

Zinc Carbonas.

$ZnCO_3.(ZnH_2O_2)_2,H_2O=342{\cdot}163$.

Employed for tender surfaces, and to check perspiration.

Zinci Chloridum. (*Off.*). $ZnCl_2=136{\cdot}29$.

In deliquescent masses soluble 1 in 0·34 of water.

Causticum Zinci Chloridi.

Zinc Chloride 4, Solution of Antimony Chloride 2, Starch 1, Glycerin *q.s.*

Collodium Zinci Chloridi. 1 in 6 of collodion.

Collutorium Astringens, R.D.H.

Zinc Chloride 1 grain, Zinc Sulphate 1 grain, Water to 1 ounce.

Guttæ Zinci Chloridi, R.O.H. 0·125, 0·25 or 0·5% and $\boxed{\text{P1}}$ 0·25 or 0·5 with Cocaine Hydrochloride 2% (St. Th. H. 0·25).

Guttæ Zinci Chloridi cum Adrenalin, R.O.H.

Zinc Chloride 0·25, Adrenalin Solution (1 in 1,000) 12, Chloretone 0·5, Sterilised Distilled Water to 100.

Guttæ Zinci Chloridi (Aural) G.N.C. Zinc Chloride 4 grains, Glycerin 2 drachms, Alcohol to 1 ounce.

Liquor Zinci Chloridi (*Off.*). Sp. Gr. 1·530.

Four minims of this solution = 3 grains of solid Zinc Chloride. On diluting, a trace of hydrochloric acid will be necessary to clear it. We have found that three drops are sufficient to keep a dilution of 5 Cc. in 100 Cc. of water permanently clear. The precipitate is stated to be Zinc hydroxy-chloride (called roughly 'Oxychloride.') $5Zn(OH)_2ZnCl_2H_2O$.

F. **Norsk** employs Hydrogen Peroxide to oxidise Iron which may be present in the solution in making, then precipitating it with Zinc Oxide, filtering and evaporating to Sp. Gr. 1·55 to 1·58.

Uses.—A powerful odourless caustic, antiseptic, and anti-putrescent. The liquor is a strong deodorising antiseptic solution; it is *very poisonous.* Ten grains to the ounce of water may be used as a stimulant lotion to wounds.

Tuberculous joints and lupus vulgaris are treated by applying 10% or stronger solution.

In the treatment of erosion of teeth is useful to touch painful spots, or the addition of a little to Chloroform-Mastich forms a useful paint.—Smale and Colyer.

Ozæna.—Zinc Chloride as 1% spray valuable, combined with washing 2 or 3 times a day.—Dundas Grant, Pr., Mar., 1912.

Lotio Zinci Chloridi, R.O.H., 0·12 or 0·25%.

For wounds Zinc Chloride solution 40 grains to the ounce was much favoured by Lord Lister. Prevents the occurrence of putrefaction in spite of access of septic material. Importance of free drainage.—G. T. Beatson, L. ii./15,1214.

Ⓟ**Pasta Zinci Chloridi cum Opio, R.O.H.**

Macerate Opium 1½ ounces in 12 ounces of Boiling Water for 12 hours, add 6 drachms of Hydrochloric Acid and filter. Then dissolve Zinc Chloride 16 ounces in the filtered liquor and make up to 20 ounces with Distilled Water. To each ounce of the above Solution add Wheaten Flour 120 grains, mix smoothly in a mortar and heat over a water bath until of a proper consistence.

Schulze's Chlor-zinc-iodine Reagent for Cellulose.

Dissolve 110 Gm. of Zinc in 300 Cc. of pure Hydrochloric Acid, and evaporate o 150 Cc. (Sp. Gr. about 1·8). Dissolve separately 12 Gm. Potassium Iodide in as little water as possible; add 0·15 Gm. Iodine.

Mix the Solutions, and filter if necessary, through asbestos.

Should have a dark sherry-brown colour.—Bower and Gwynne-Vaughan.

Zinci Citras. $[C_3H_4(OH).(COO)_3]_2Zn_3+2H_2O=610·282$.

Dose.—3 to 12 grains (**0·2 to 0·8 Gm.**).

White powder with metallic taste, not perfectly soluble in water. Used for epilepsy.

P1 **Zinci Cyanidum.** $Zn(CN)_2=117·40$.

Dose.—$\frac{1}{10}$ to 1 grain (**0·006 to 0·06 Gm.**).

An insoluble white powder, is of value in heart diseases and resembles digitalis in its effects in that it relieves palpitation and irregularity of heart action. Antiseptic, not equal to **Mercuro-Zinc Cyanide,** *q.v.*

P1 **Zinci et Potassii Cyanidum.** $Zn(CN)_2.2KCN=247·63$.

Dose.—$\frac{1}{10}$ to 1 grain (**0·006 to 0·06 Gm.**).

A soluble cyanide, possessing the properties of hydrocyanic acid.

Zinci Iodidum. $ZnI_2=319\cdot21$.

Average dose.—1 grain (0·06 Gm.).

A white deliquescent powder turning brown on exposure. For cerebral, spinal, and nervous diseases in the third stage of syphilis.

Zinci Lactas. $(C_2H_4.OH.COO)_2Zn, 3H_2O=297\cdot558$.

Dose.—½ to 3 grains. (0·03 to 0·2 Gm.). Max. *pro die* 10 grains. (Has been used in France up to 3 Gm. for a dose!—Dorvault).

White crystals soluble 1 in 60 of water. In epilepsy.

Zinci Oxidum, Zinc Oxide. $ZnO=81\cdot37$.

Dose.—3 to 10 grains (0·2 to 0·65 Gm.). **Tablets,** 2 grains.

For nervous debility, migraine, hysteria, and to check night sweats.

Unguentum Zinci (*Off.*). Zinc Oxide 15% in Benzoated Lard. Now made by trituration (cold).

Unguentum Zinci Carbolisatum. Zinc Oxide 10, Phenol 2, Soft Paraffin 88. Dermatitis is well treated with this.

Unguentum Zinci cum Acido Salicylico.

Salicylic Acid 40 grains, Zinc Ointment 1 ounce, Soft Paraffin 1 ounce.

Vaselinum Zinci Oxidi.

Zinc Oxide 1, White Vaseline 9. For surgical use.

Vaselinum Zinci Oxidi cum Amylo.

Zinc Oxide 20, Starch 20, Thiol (Liquid) 1, Vaselin 50.

We have had this preparation—a prescription of the late Radcliffe Crocker—very highly spoken of for use in skin affections.

Cremor Zinci.

Zinc Oxide 3, White Vaseline 17, Perfume *q.s.* Is much superior to violet powder for nursery use.

Cremor Zinci, St. M.'s H. (*Old formula, now altered.*)

Dissolve Lanolin 3 in Olive Oil 8 by heat, sift Zinc Oxide 8 into the mixture and whip up with Lime Water 8.

In acute eczema (drying stage) where there is much redness, this is even superior to Lassar's Paste.—B.M.J. i./09,1342.

Cremor Zinci et Calaminæ, V.C.H.

Prepared Calamine 1, Zinc Oxide 1, Lime Water 4, Olive Oil 4.

Gelatinum Zinci. Unna's Paste.

Gelatin 4, Water 16, soak 12 hours, then heat to dissolve, and add Zinc Oxide 6, previously rubbed down with Glycerin 12. For use it is melted and applied with a brush to eczematous surfaces. Ichthyol, Resorcin and other medicaments may be added.

Varicose ulcers treated by Zinc Gelatin after thoroughly cleansing the leg or foot with Soap and Spirit, Alcohol, Mercuric Chloride Solution 1 in 2000 to 1 in 4000 or 1 in 40 Carbolic Lotion. The Paste previously melted and cooled is poured over the ulcer, which has previously been disinfected with Hydrogen Peroxide or Mercuric Chloride or Carbolic Lotion. The part is then dried and the paste is bandaged on with a gauze bandage. Another layer of paste is applied; this is covered with a bandage, and so on until four layers have been applied. May be left in many cases undisturbed for weeks, but it is safer to dress again after two or three days with Salicylic Talc if any discharge. It forms a new skin pliable and slightly elastic.—L. ii./09,1423; ii./10,1716.

Pasta Zinci cum Amylo. St. M.'s H.

Zinc Oxide, Starch, Soft Paraffin, Lanolin, of each equal parts. For intertrigo and disordered perspiration.

***Pellanthum** (T.M. 261943), containing 20% Zinc Oxide, is a special preparation and is cooling and soothing for irritable surfaces.

Compounds are Ichthyol, 3%, 5%, 10%; Ichthyol, 10%, with Resorcin 5%; Salicylic Acid 1% and 2%; Liquor Carbonis Detergens 10% and 15%; Huile de Cade 5%; Phenol 2% with Menthol 2%.

Lassar's Paste for Eczema. Zinc Oxide 24, Starch 24, Salicylic Acid 2, Vaseline 50. = **Pasta Zinci Compositi, U.C.H.**

The original formula contained Wool Fat in addition, but no Salicylic Acid.

Useful in chronic and acute eczema when weeping.

In irritating conditions the acid may be omitted. It may be retained and increased in amount where there is less inflammatory reaction and where much scaling has occurred.—B.M.J. i./09,1342.

Pasta Carbonis et Zinci.

Soak Gelatin 16 in a portion of the total Glycerin required (20), and a portion of the water (50 in all required), for 12 hours. Make a paste of Boric Acid 6, Zinc Oxide 6, and Charcoal 18 with remainder of liquids, mix on water bath, and pour into suitable vessel to set.

For leg ulcers the Charcoal is a useful addition. Boric Lotion fomentation should first be carried out to clean the ulcer. If tending to be sluggish Red Lotion helps.—B.M.J. i./09,899.

Ⓟ**Pilula Zinci cum Belladonna, T.H.**

Zinc Oxide 2 grains, Extract of Belladonna ⅛ grain. *Dose.*—1 or 2 at bedtime.

Zinc Oxide, Starch, Boric Acid, and powdered **Orris Root,** and mixtures of these, are employed for the toilet.

Calamina Præparata B.P. 1885.

Syn. Lapis Calaminaris Præparatus.

Impure zinc oxide prepared by calcining native Calamine (zinc carbonate) and reducing it to an impalpable powder. Genuine Calamine is useful as a dusting powder, and for making lotions, and may be mixed with Carmine Triturate to produce the desired tint.

Linimentum Calaminæ, G.H.

Rub prepared Calamine 20 grains, Zinc Oxide 15 grains (and other powders, if ordered) with Water 4 drachms, then incorporate Olive Oil to 1 ounce. U.C.H. has Levigated Calamine 40 grains, Zinc Oxide 22 grains, Zinc Oleate 13 grains, Wool Fat 13 grains, Soft Paraffin 1½ drachms, Liquid Paraffin to 1 ounce.

Lotio Calaminæ U.C.H., E.L.

Levigated Calamine 40 grains, Zinc Oxide 20 grains, Glycerin 14½ minims, Water (or Rose Water) to 1 ounce. Elutriate the calamine and zinc oxide by triturating them in a mortar with successive portions of the water and decanting from the siliceous matter, and add the glycerin. Used in eczema, especially where the surface is d and tender, also to conceal acne spots on the face. One grain mercuric chloride may be added to 6 ounces as antiseptic.

Ⓟ**Lotio pro Acne, N.H.W.** is similar.

For chilblains on the hands this lotion and the following made double or treble strength allay the intense irritation.

In cutaneous affections, *e.g.*, of rheumatic origin a lotion of this kind is useful.—J. Galloway, Pr., Jan. '12,76.

In skin affections the use of Zinc Oxide and Bismuth Carbonate is merely protective.—B.M.J. ii./13,1012.

Lotio Calaminæ Oleosa, St. M.'s H., E.L.

Calamine 40 grains, Zinc Oxide 20 grains, Lime Water 3 drachms, Olive Oil 1 ounce.

In chronic eczema, *e.g.*, to a freely weeping surface with redness and itching apply with brush or cotton wool swab or spread on thin washed butter muslin. Very important that the inflamed surface should not be treated with a hot thick dressing. Perchloride 1 in 2,000 to 1 in 3,000 may be desirable addition.—B.M.J. i./09,1341.

Unguentum Plumbi cum Calamina 'ERYSIPELAS DRESSING,' **St. G. H.** Lead Plaster 5, Calamine 1, Lard 4, Olive Oil 2

Zinc Oxy-Phosphate is employed as a dental filling. It is supplied in the form of dried powdered zinc oxide in various colours, with the 'liquid,' which consists of phosphoric acid. These are mixed intimately prior to use as a flooring when not too near the pulp.

Zinc Oxy-Sulphate. Consists of calcined zinc sulphate and zinc oxide; mucilage of acacia is used to mass.

10 *grains* (*as much as lies on a sixpence*) *mixed quickly with at least* 5 *drops of the Fluid makes a good mass which sets as hard as stone.*

Fletcher's Artificial Dentine is similar.

Zinc Oxy-Chloride. The 'powder' is of zinc oxide and the 'liquid' zinc chloride solution. Mix thoroughly. Sometimes used as a root-filling and for sensitive dentine. Will irritate a live pulp.

Zinci Salicylas. $Zn(C_6H_4.OH.COO)_2+3H_2O=393{\cdot}568$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystals soluble in water 1 in 24, and in alcohol 1 in 2·5. As dusting powder and may be combined with gelatin (*v.* Gelatinum Zinci). Internally is used as a substitute for the Valerianate.

Zinci Sulphas (*Off.*). $ZnSO_4.7H_2O = 287{\cdot}542$. *Dose.*—1 to 3 gr. (**0·06 to 0·2 Gm.**) tonic; 10 to 30 gr. (**0·6 to 2 Gm.**) emetic. FR. CX. Max. single and daily dose 15 grains.

Soluble 1 in 0·65 water at 59·5° F.—P.J. i./02,552.

Uses.—For gleet and gonorrhœa ½ to 1% injections are given frequently combined with alum or sometimes Ferrous Sulphate.

Collyrium Adstringens Luteum. P. Austr. (1906). Ammonium Chloride 2, Zinc Sulphate 5, Distilled Water 890, dissolve and add Camphor 2, dissolved in diluted Spirit (Sp. Gr. 0·895) 100, then add Saffron 1. Digest 24 hours and filter. As an astringent lotion is used for conjunctivitis.

Diplobacillary infection of the eye (Morax Axenfeld bacillus) is quickly cured by zinc salts.—Axenfeld.—B.M.J. ii./08,738.

A Collyrium containing ½ grain of Zinc Sulphate and 10 grains Boric Acid per ounce preferable to organic Silver Compounds.—L. ii./11,1570.

Meningococcus infections (carriers) cleared up by means of 1·2% solution in the 'Falmouth Steam Atomizer.'—B.M.J. ii /16,673.

Chlorosis can be rapidly cured by emetic of 20 grain doses for 6 to 8 days, in the morning fasting, of zinc sulphate. Iron sulphate (common) originally given by an old dame.—B.M.J. ii./08,1145.

Chlorosis has been treated by various methods of removing fluids from the body.—B.M.J. ii./09,1668. *c.f.* Caffeine, p. 244.

Lotio Rubra U.C.H. Zinc Sulphate 2 grains, Compound Tincture of Lavender 12 minims, Water to 1 ounce.

'Solubes' Zinci Sulphatis are equivalent to 2 and 10 ounces respectively of the above lotion.

'Solubes' Zinci Sulphatis et Aluminis contain 10 grains of each, for dissolving in a pint, more or less as required, of warm water.

'Collapsubes' of Zinc Sulphate 1 grain in 1 ounce of gelatin basis are for gleet and gonorrhœa.

Lotio Zinci Sulphatis. R.O.H. is Zinc Sulphate 0·25 or 0·5% in Distilled Water. Guttæ Zinci Sulphatis, 0·125, 0·25 or 0·5%.

Lotio Sulphatum.

Zinc Sulphate 30 to 40 grains, Alum 30 to 40 grains, Ferrous Sulphate 20 grains, Copper Sulphate 2 grains, Water 8 ounces.

Ophthalmic Discs of $\frac{1}{250}$ grain **Zinc Sulphate** and $\boxed{\text{P1}}$ $\frac{1}{250}$ grain each **Zinc Sulphate and Opium** also **Zinc Sulphate** $\frac{1}{250}$ grain with **Atropine** $\frac{1}{5000}$ grain are made.

Points of Zinc Sulphate are moulded for intra-uterine use. **Points** of equal parts **Zinc Sulphate** and **Alum,** and of **Copper Sulphate** are also made.

Lotio Zinci Sulphidi St. J. H.

Zinc Sulphate and Sulphurated Potash of each 15 grains, Water to 1 ounce.

Zinci Stearas, U.S.

A fine white powder, yielding 15·5% of Zinc Oxide. Contains a small proportion of palmitate. Manufactured by precipitating a Curd Soap solution with Zinc Sulphate.

ZINGIBER. *Off.*

Dried rhizome (scraped) of *Zingiber officinale* (*Scitaminaceæ*). *Dose.*—5 to 15 grains (**0·3 to 1·0 Gm.**) P.G.V. has the rhizome not scraped.

Must yield 5% to Alcohol and 8·5% to Water.

Fluidextract. U.S. 1=1, alcoholic. *Average dose.*—15 minims.

Syrupus Zingiberis (*Off.*). *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Ginger 1, Alcohol 90% *q.s.* to 2 by percolation, add Syrup *q.s.* to 40.

Pulvis Aromaticus U.S. *Average dose.*—15 grains.

Saigon Cinnamon 35, Ginger 35, Cardamom 15, Nutmeg 15.

Tinctura Carminativa, B.P.C. *Dose.*—2 to 10 minims.

Essence of Ginger 6·25 (B.P. 1885), Cardamom Seeds, bruised, 6·85, Oil of Cinnamon, Oil of Caraway and Oil of Cloves of each 1·04. Macerate the Cardamoms in Alcohol (90%) 75 for a week, decant, express, and dissolve the oils in the mixed tinctures, adding Alcohol (90%) *q.s.* to 100.

Tinctura Zingiberis Fortior, Essence of Ginger, B.P. 1885, Ginger 1, in Alcohol (90%) 2. *Dose.*—5 to 20 minims.

Tinctura Zingiberis (*Off.* and B.P. 1898). *Dose.*—30 to 60 minims. Prepared 1 in 10 Alcohol 90%.

Gingerin. *Dose.*—¼ to 1 grain (**0·016 to 0·065 Gm.**), in a pill or much diluted with spirit.

The treacle-like oleo-resin of ginger made by percolation with ether or acetone and subsequent evaporation. Added to purgative pills to prevent griping.

Gingerol of Grier confirmed by A. Lapworth. It has been converted into a crystalline derivative and further broken down by the latter investigator into a crystalline pungent principle. Finally gingerol has been synthetised on these lines.—P.J. i./17,201. See also ii./17,172,205.

'Hippocras.'

Dose.—As required. Ginger, Cloves, Mace, Nutmeg, Galangal, of each 1 drachm, Cinnamon 2 ounces, White Wine 1½ gallons, Sugar 40 ounces, Digest 3 days. Stomachic and antispasmodic.—From an old herbal.

Mistura Carminativa. *Dose.*—½ ounce (**15 Cc.**).

Tincture of Ginger 3 drachms, Compound Tincture of Cardamoms 9 drachms, Tincture of Capsicum 1 drachm, Spirit of Ether, 3 drachms, Spirit of Chloroform 1½ drachms, Peppermint Water to 6 ounces. A dose every 2 or 3 hours useful in dyspepsia.—W. H. Willcox, Med. Press.

ALTERNATIVE PREPARATIONS.

Sanctioned officially for use in the Tropics and Sub-Tropics.

Aquæ Olei Anethi, Anisi, Carui. Cinnamomi, Fœniculi, Menthæ Piperitæ, and Menthæ Viridis.

Each of these waters may be made by triturating the corresponding Oil with twice its weight of Calcium Phosphate and 500 times its volume of Distilled Water, and filtering the mixture.

(The series of Flavouring Agents entitled respectively * '**Glyl**' and * '**Syl**' Flavourings which we have arranged should commend themselves to workers in Tropical Countries.)

Emplastra.—In the tropics more or less Hard Soap, Resin, or Yellow Bees-wax may be used, but the official proportion of the active ingredient must in all cases be maintained.

Extracta Liquida.—Any Liquid Extract liable to ferment containing less than one-fourth of its weight of Alcohol (90 per cent.), may have this increased to one-fourth of the weight of the Extract.

Limonis Cortex Siccatus.—In the Tropics dried Lemon Peel may replace fresh Lemon Peel.

Suppositoria.—More or less White Bees-wax may be used in place of an equivalent amount of Oil of Theobroma, when otherwise they would be too soft for convenient use in the Tropics, *c.f.* our experiments under Ovules and Suppositories.

Syrupus Rhœados.—The quantity of Alcohol may be increased or doubled, replacing an equivalent quantity of water.

Unguenta.—In the Tropics and Sub-tropics these may be made harder or softer according to the needs of the climate. *c.f.* Adeps Lanæ, Paraffina, and Unguenta for various Ointment bases and Vol. II. for results of our experiments on Melting Points and Consistence of Compound Ointment bases.

SUPPLEMENTARY LIST OF DRUGS.

Abrus Precatorius (*Leguminosæ*) Jequirity Seeds, Prayer Beads, Jumble Beads, Indian Licorice, of scarlet colour, contain abrin, a poisonous principle.

Jequiritol (Guttæ R.O.H.) is a glycerinated solution to produce artificial inflammation in eye affections.

Acaciæ Cortex (*Off.*). *A. arabica* and *A. decurrens.* Dried bark kept for one year. **Decoctum** (*Off.*). *Dose.*—½ to 2 oz. 6% in water. Astringent, suitable as gargle or lotion = Oak bark.—E.P.I. i. 21; Pg. I. i. 550, 556.

Acaciæ Mucilago. *Off*—Gum Acacia from *A. Senegal* and other species (*Leguminosæ*) 4, washed to remove any adherent dust, dissolved in Water 6. This quantity measures about 8¾. About ½ grain of Benzoic Acid in the ounce will keep it. *Incompatible* with Acacia are Alcohol, Mineral Acids, Borax Ferric Salts, most Lead Salts. Bismuth Carbonate should not be suspended with Acacia Mucilage. Tragacanth answers better.

Gum Acacia consists in the main of a mixture of Alkali Arabinates. Arabinic Acid, according to O'Sullivan, appears to comprise a combination of a simpler acid, viz., Arabic Acid $C_{23}H_{33}O_{22}$ in conjunction with two sugars Arabinose and Galactose. He suggested the formula

$$2(C_{10}H_{16}O_8), 4(C_{12}H_{20}O_{10}), C_{23}H_{30}O_{18},$$

Arabinose, Galactose, Acid Group,

for the Arabinic Acid. Kordofan Gum Arabic contains 12 to 15% moisture while Gum Senegal contains rather more. If the amount exceeds 20% the gum instead of being brittle is tough and difficult to grind to powder. The acidity of Gum Arabic is very slight—1,000 parts requiring only about 2 parts of Potash to neutralise.

The optical rotation of good gum lies between $(\alpha)_D = -23°$ and $-34°$, but occasionally samples are strongly positive rotatory. Viscosity Tests are also of importance in evaluation—From an interesting leaflet issued by A. Kingston and Co., London.

The *Straining of Mucilage* can be well effected by forcing it through muslin by air expansion. A bottle about ½ full of the mucilage is tied tightly over the neck with muslin, thoroughly cooled and then on bringing into a warm situation and inverting, the mucilage will be forced through. When it ceases to drop the process of alternate cooling and heating is repeated. To obtain an absolutely bright mucilage, the process might be reversed making the bottle (above)—previously heated—the receiver.—P.J. ii./09,6. **Mucilago, U.S** contains Acacia 34, Lime Water 33, Water to 100. The alkali is a useful addition. **Syrupus Acaciæ, U.S.**, Acacia 10, Sugar 80, Water to 100.

Potion Gommeuse. Fr. Cx. Gum Acacia Powder 1, Syrup 3, Orange Flower Water 1, Water 10, Parts by weight.

Gum Acacia Solution for Intravenous Injection.

Gum Acacia 70 Gm., Sodium Chloride 9 Gm., Water to 1 litre, (Distilled Water not essential except for bacteriological reasons). The solution to be sterilised after straining through fine linen. The addition of any antiseptic is not desirable.

To raise blood pressure after loss of blood, *e.g.*, from a wound of the femoral artery. Many such cases could be saved if the blood pressure could be kept up for 24 hours or so. The solution has the same viscosity as the blood and a content of colloids with osmotic pressure equal to that of the blood. Hence after its injection there is little tendency for water to pass into the tissues.

In certain conditions the permeability of the blood vessels is increased in such a way that blood plasma itself escapes without the corpuscles. In others water alone escapes leaving proteins in addition to the corpuscles. In the former the blood requires diluting with a solution having the viscosity of blood plasma, not that of the whole blood. **Dextrin** 2·5% has viscosity rather less than that of the plasma while its osmotic pressure is rather higher than that of blood colloids. The concentration might well be higher than 2·5% clinically—W. M. Bayliss, B.M.J. i./17,564.

Even 2% of Gum has properties superior to the salts alone. Solutions of 5% or over will restore permanently the low arterial pressure due to loss of blood.—W. M. Bayliss, B.M.J. ii./17,808; i./19,262.

Shock from wounds well treated by the method (6% solution).—B.M.J. i., 18,553

Gelatin 2% has also been suggested.—Med. Res. Com., B.M.J. i./17,383.

Surgical shock treated by intravenous infusion of 1 to 1½ pints Normal

Saline containing 3% Gum Acacia and 1% Glucose. Surgery at advanced operating centre.—C. F. M. Saint, B.M.J. i./18,473.

The Balance of Colloid and Crystalloid in cholera, Shock and allied conditions.—B. Moore, B.M.J. ii./19,490.

Ghatti Gum is from *Anogeissus latifolia* (*Combretaceæ*)—used technically chiefly. **Mucilago** of this is now *Off.* 1 to 3 of water.

Acidum Chromicum. *Syn.* **Chromic Anhydride.**—(*Off.*). $CrO_3=100{\cdot}0$.

Manufacture.—To obtain pure crystals, mix 300 Potassium Bichromate with Water 500 and add Sulphuric Acid (Conc.) 420 (by vol.). Allow mixture to stand 12 hours. Acid Potassium Sulphate crystallises out which remove. Heat the mother liquor to 80 to 90° C. and add Sulphuric Acid 150 (by vol.), also Water, *q.s.*, to dissolve the chromic anhydride crystals which at first throw out. After standing 12 hours decant the liquid from the crystals that have separated and concentrate to obtain further yield. Drain on a porous plate and wash with Nitric Acid, Sp. Gr. 1·46, and dry in a current of warm air.—U.S.D. In deliquescent, crimson crystals. A powerful oxidising agent. ***Caution : Incompatible*** with alcohol, glycerin, and other oxidisable substances. ***Soluble*** about 5 in 3 of water.

Liquor (*Off.*).—25% *w/v* in water. Aqueous solution 1 in 4, or stronger —is applied to warts on genitals, to condylomata and lupus ; and 1 in 40 to ulcerated gums and mouth sores. For sweating feet 5 to 10% Lotion ; in leucorrhœa and ozœna 1 in 2,000. In hæmorrhagic endometritis, curettage followed by application 1 in 8.—B.M.J. i./06,921. In secondary syphilis of the pharynx the so-called snail-track ulcer is best treated with a solution (10 grains to the ounce).—B.M.J. ii./09,197. For mucous and warty patches 5% useful.—B.M.J. ii./09,545. Old warty cicatrix of lupus or development of ulcerations having a cancerous nature, well treated by applications of chromic acid after well scraping it, also serviceable in superficial rodent ulcers. —Pres., Dec., 1911.

Ulcerative stomatitis. The organisms concerned are obligatory anaerobes. The necrotic tissue once formed presents an almost impervious barrier to the action of lotions containing peroxide and other antiseptics. Simple lavage of the mouth is insufficient and swabbing of the affected area is always required. Chromic Acid relieves pain and removes the necrotic tisssue best. Used warm 1 in 200 to 1 in 400 and applied with wool round a probe. Immediately after the use of the chromic lotion paint the affected area with a mixture of 20 grains of Chloretone to the ounce of equal parts glycerin and spirit. Cocaine 10 grains and Salol 30 grains to the ounce may be used if Chloretone is not available.

Potassium chlorate 10 to 15 grains with Ferric Chloride and Magnesium Sulphate should be given internally. *B. fuseformis* Vaccine successful in the acute stages.—Sir K. Goadby, L. i./16,959.

Chromii Sulphas $Cr_2(SO_4)_3+18\ H_2O$ (Chromic Sulphate) has been given in 3 grain doses—probably less would be safer to test idiosyncrasy of patient towards the drug.

Acidum Gallicum. $C_6H_2(OH)_3COOH+H_2O=188.099$.

Dose.—5 to 15 grains. Crystals or crystalline powder of brownish colour. Soluble in water about 1 in 100, in glycerin 1 in 12, in alcohol 90% 1 in 5. Properties and uses similar to Tannic Acid, *q.v.*

Acidum Hydrofluoricum $HF = 20{\cdot}008$ *Syn.* **Fluoric Acid** of commerce redistilled for medicinal use. Manufactured by the action of Sulphuric Acid on Fluor Spar (CaF_2) in lead or platinum vessels. It contains about 30% of the gas, emits suffocating fumes, and requires to be kept in gutta-percha or leaden bottles.

Acidum Hydrofluoricum Dilutum, B.P.C. *Dose.*—5 to 15 minims.

Contains 0·2%. Even thus diluted should not be kept in glass bottles for use. Has been given for goitre.

Ammonii Fluoridum $NH_4F = 37{\cdot}042$. *Dose.*—4 grains may be considered more than a maximum.—W.H.M. This salt (soluble 5 in 6 of water) has been suggested to diminish enlarged spleen and in goitre in doses of 5 to 20 minims of solution, 4 grains in an ounce, after meals (supply in a gutta-percha bottle). For phthisis, inhalation from a 1 in 500 solution has been recommended.

Incompatible with Nitric Acid, Quinine Salts, Spirit of Nitrous Ether and **soluble Calcium Salts, but compatible with** Tinctura Ferri Perchloridi. **Calcii**

Fluoridum. $CaF_2 = 78{\cdot}07$. *Dose.*—¼ to ½ grain suitably diluted. White powder insoluble in water, has been advocated for improvement of the teeth and building up bone. **Ferri Fluoridum. Ferric with Ferrous Fluoride.** *Dose.*—$\frac{1}{20}$ to ½ grain. A purplish grey insoluble powder, possessing hæmatinic properties has been used for enlarged spleen. **Quininæ Fluoridum.** $C_{20}H_{24}N_2O_2$, $HF = 344{\cdot}32$. *Dose.*—$\frac{1}{20}$ to ½ grain. In relieving enlarged spleen and in rickets. **Sodii Fluoridum.** $NaF = 42{\cdot}00$. *Dose.*—$\frac{1}{20}$ to ½ grain. Antiseptic in phthisis. Active against *Staphylo* and *Streptococci* and *B. pyocyaneus* and fairly so against *B. aerogenes capsulatus* *c. f.* "Specificity in Antiseptics," *Vol. II.* **Fluoroform.** $CHF_3 = 70{\cdot}013$. A 2 to 2½% solution (the solubility is 2·8%) under the designation **Aqua Fluoroformi** is employed for pertussis, phthisis, and as a muscular tonic. Odourless, tasteless, and non-poisonous, and does not impair digestion. *Dose.*—For young children 1 teaspoonful every hour, for older children ½ ounce. Two patents taken out for making this.—P.J. ii./o8,258.

Acidum Malicum *Syn.* **Hydroxysuccinic Acid.** $C_2H_3(OH)(COOH)_2 = 134{\cdot}048$. *Dose*, 1 to 5 grains. White deliquescent crystals soluble in water 1 in 1, and in Alcohol 1 in 1½. Has been used as throat spray in diphtheria, and other throat affections. Possesses properties similar to Tartaric Acid in a modified form. It is chemically allied to Succinic Acid. In phthisis much larger doses—up to 2 drachms have been given.

As an antiseptic found to be specific against the gas bacillus (*B. aerogenes capsulatus*), *vide Vol. II.*

Acidum Meconicum. $C_7H_4O_7,3H_2O = 254{\cdot}115$. White crystals slightly soluble in water. Forms soluble salts with Opium Alkaloids. It occurs in good opium to extent of 5 to 8%. Has little or no physiological action. Apparently only contains 2 Carboxyl groups though triatomic. Salts are of variable composition.—P.J. ii./o5,548.

For recent method of assay of the Acid in the drug *vide* P. Van der Wielen.—P.J. ii./13,114. *c.f. also Vol. II.*

Acidum Osmicum. $OsO_4 = 254{\cdot}9$.

Syn. Osmium Tetroxide, Hyperosmic Acid. *Dose.*—$\frac{1}{64}$ to $\frac{1}{10}$ grain. In waxlike yellow crystals. Its vapour is intolerably pungent. Soluble slowly about 1 in 50 of water. It is poisonous and a powerful oxidizing body. **Liquor,** 1% (in water). *Dose.*—2 to 10 minims, hypodermically. This is used in microscopy; fat and medullary matter are blackened by it.

This and **Potassium Osmate** 1% solution in 2 to 10 minim doses have been injected hypodermically (painful) for neuralgia, for strumous glands, goitrous swellings, sarcoma, and cancer; also sciatica and muscular rheumatism, and given internally in epilepsy.

Liquor Acidi Chromo-Aceto-Osmici (Flemming's Strong Solution). Mix Glacial Acetic Acid 100 with Osmic Acid 8 in water 400, and Chromic Acid 15 in water 1,500. Cancerous growths have been treated: 8 Cc. injections at edge of tumour, or 1 Cc. just beneath its surface. Also for fixing, in histology.

Acocanthera. — *Syn.* — Toxicophlœa. Hottentot's Poison Bush. *Kaffir*, Intlungunyembe or Ubuhlungu Benyoka. Not legally a Scheduled Poison, but a potent drug, producing strong contraction of the heart. There are several species. *A. Venenata* is employed in South Africa, here referred to. Probably all contain Ouabain or allied glucoside, but that of *A. Venenata* thought to be distinct, *c.f.* Edn. XIV. Evidence of an alkaloid also Leaves, young twigs and roots are used for snake-bite by producing vomiting. —C.D. i./o8,20. Originally the plants were employed as arrow poisons.

Extractum Liquidum (1=1) from the leaves. A. D Waller, F. R.S. showed physiologically for us that the leaves are more powerful than the stem and that the *dose* of the Liquid Extract of the leaf may be taken as about 2½ to 7½ minims (0·15 to 0·45 Cc.), *i.e.*, ½ a dose of Tincture of Digitalis, B.P. '98. This is only tentative and more exact comparison, *e.g.*, with aconitine is desirable. *c.f.* also Proc.Phys. Soc., Dec. 19/o8, Jl. Phys., vol. xxxviii. For use as a substitute for digitalis in heart disease.

[P1] **Aconitum ferox,** renamed *A. spicatum.* (According to Holmes *A. laciniatum* is the probable source of Nepaul Aconite.)—Root, called *Bish* or *Bikh* in India. Contains Bikhaconitine, virulently poisonous. It is the analogue of pseudaconitine. It is permissible to administer in dose ¾ of that of *Aconitine* from *A. Napellus.*—C.D. ii./o5,478. It is in bolder roots than the official and these are horny in fracture. Internally relieves neuralgia and acute gout, and externally a valuable liniment for chilblains. [P1] Tincture, 1 in 8 of 90% alcohol.

Dose, 1 minim hourly. Botanical descriptions of poisonous and non-poisonous Indian Aconites.—P.J. i./03,63.

P1 **Aconitum Fischeri**—Produces Japanese Aconite Root, of which much has at times been imported. It is also said to come from Kamschatka. It is very pungent, and yields Japaconitine (P.J. 1894,813) *c.f.* Vol. II. *A. japonicum* with yellowish white flowers, has been identified as a variety of *A. Lycoctonum*.

P1 **Aconitum Lycoctonum** contains Lycaconitine $C_{26}H_{46}N_2O_{10}$ a strong base and Myoctinine $(C_{36}H_{46}N_2O_{10})_2$. Products of Hydrolysis are described.—Schulze and Biertung, Arch. Pharm., 1913,8.

Aconitum heterophyllum.—Root, known as *Atis* or *Atees*, or *Jadbar* in India, is neither poisonous nor antipyretic, but is tonic, and possibly aphrodisiac in action. It contains a large quantity of starch. *Dose*, in powder, 5 to 20 grains; of tincture, 1 in 8 of 90% alcohol, 10 to 60 minims.

Adeps Præparatus *Off.—Syn.* ADEPS SUILLUS, AXUNGIA, **Ph. Ned. Adeps Lotus P. Dan.**

The purified fat of the hog, *Sus scrofa* (Linn.)—from the 'flare' or 'omentum' contains 60% triolein (sold when separated by freezing and pressure as 'Lard Oil'), *v.* Sapones. *Vol. II.* The remainder is palmitin and stearin *Soluble* in ether 1 in 22, hardly soluble in alcohol.

Officially, owing to shortage—

Wool fat or Hydrous Wool Fat singly or together with such addition if any of Hard Paraffin, Liquid Paraffin, Soft Paraffin, Paraffin Ointment, White Beeswax, Yellow Beeswax or any combination as might be necessary to impart a proper colour or consistence to the product were allowed to be used during the war in making official preparations in which lard or **Prepared Suet** is directed.

Arachis or Sesame Oil instead of Olive Oil. 'Neutralised Second' Castor Oil could be used for Castor Oil *Off.*—Official. L. i./18.543.

Adeps Induratus is for use in the tropics. The liquid constituent is removed to a great extent by pressure.

Adeps Benzoatus (*Off.*) is made with 3% Benzoin. To be avoided as a basis for eye ointments.

Adonis vernalis (P. Austr.).—Contains a hygroscopic glucoside Adonidin, which resembles Digitalis in its action, but is said not to be cumulative. *Dose*, in powder, 3 to 6 grains; of infusion 1 in 40, 4 drachms; of Adonidin, ¼ to ½ grain daily. Is a cardiac tonic and diuretic effecting disappearance of throbbing headache, perspiration, and dyspnœa. Epilepsy is treated with it combined with Bromide. Tincture.—Leaves and Stalks employed 1 in 10.—*Dose*, 10 to 30 minims.

Adonidin is a local anæsthetic and suitable for use in ophthalmology. In chronic glaucoma, iritis, and irito-cystitis 1% solution has been used, 3 drops relieve pain.

Æsculus Hippocastanum.—Horse-Chestnut. Tincture of Seeds 1 in 10 proof spirit for painful hæmorrhoids. *Dose.*—10 minims night and morning. Also emmenagogue.—P.J. ii./96,79. A liquid extract has been used, painted on or rubbed in, in rheumatism and neuralgia. **Kastanol.**—Extractum Hippocastani Liquidum with 8% camphor; used in rheumatism.—(Austria.) Ph. Notes.

Argyresein $C_{54}H_{86}O_{24}$=1118·958, is the principle to which antihæmorrhoidal action is due.—P.J. i./09,645.

Æsculin, $C_{15}H_{16}O_9.1\frac{1}{2}H_2O$=367·227, a glucoside, soluble in water, to which 2 to 3% Sodium Carbonate is added, also soluble in alcohol. Solutions have a blue fluorescence, and have been used similarly to Quinine in X-ray and Finsen light treatment (*q.v.*). *Dose.*—1 to 5 minims of 5% solution.

Chestnuts contain from 21 to 47% of Starch and Acorns from 55 to 57%, the total sugar in addition being 11 to 19 and 6 to 9% respectively. On hydrolysis with acids about 30 gallons of absolute alcohol could be obtained from the ton of nuts.—L. ii./17,757.

Aqua Zeozoni is the name applied to a 0·3 to 0·5% solution of an oxy-derivative of Aesculin neutralised with Boric Acid. Applied to the eye it is said to absorb such ultra-violet rays of light as have a wave-length of between 300 and 400. Suggested to take the place of veils, umbrellas, etc. Specially indicated as prophylactic in blinding snow light, etc.,—no irritation to the eyes even after long continued use for a period of several months.—Amer. Jour. of Oph., Sept., 1911, Oph., 1911,807.

Æthusa Cynapium.—Fool's Parsley, Lesser Hemlock. Contains a small amount of volatile alkaloid, with the properties of Conine; calculated as hydrochloride constitutes 0·0003% of the entire fresh herb. A larger proportion under favourable conditions, may be produced leading to poisonous properties. It also contains a volatile oil, 0·015% of the entire fresh plant and resin 0·8%. Has narcotic properties. Garden Parsley, *vide* p. 163.

Æthyl Bromidum. P.G.V., FR. CX., P. JAP., P. HELV. $C_2H_5Br = 108{\cdot}97$ *Syn.* HYDROBROMIC ETHER.

Manufacture.—By mixing Sulphuric Acid 12 with Alcohol 95% 7, cooling, adding gradually Potassium Bromide finely powdered 12, and distilling on a sand-bath; the distillate obtained by adequate condenser is first shaken thoroughly with water and then with half its volume of Sulphuric Acid and allowed to stand 12 hours to remove Ethyl Ether, then with a solution of Potassium Carbonate (or 10% Soda Solution) drying on Calcium Chloride and rectifying from a water bath.—See also P.J. i./11,175. It may also be prepared by distilling a mixture of alcohol, bromine, and phosphorus, but the former is preferable for medicinal use.

A colourless, very volatile liquid with a strong peculiar odour and a sweetish warm taste, becoming brown by exposure owing to decomposition, bromine being split off. It has Sp. Gr. 1·4735, boils at 38·8° C.—(Schmidt). P.G. dilutes with spirit to improve keeping properties. *Soluble* 1 in 85 of water and miscible with alcohol 90% and ether.

It was advocated as a safe and convenient anæsthetic for short (minor nose and throat) operations. *Dose.*—1½ to 3½ drachms, by inhalation.—B.M.J. ii./02,589; L. ii./03,764; M., 1906.

According to 'Green' Part I, p. 159, however, it is dangerous, the anæsthesia being very brief, disappearing almost as soon as inhalation is closed. A closed mask should be used,—all air excluded. Has been used for operations on adenoids—said to involve more than necessary hæmorrhage.

For *local* anæsthesia it may be used as spray, or simply short covered contact for neuralgia. It may be added to Menthol Liniment. **Somnoform** (*q.v.*) contains 5%. **Ethyl Bromide Capsules.** Encased in cotton wool and silk, contain 5 minims in each; are convenient for use when crushed. Useful in asthma and epileptic convulsions.

Ethylene Bromide.—$C_2H_4Br_2 = 187{\cdot}882$. *This is poisonous—distinguish from the above.* *Dose.*—1 to 2 minims in alcoholic solution or oily solution hypodermically or in **Gelatin Capsules.** A colourless liquid, of Sp. Gr. 2·163, soluble 1 in 4 of 90% alcohol, insoluble in water. Reduces frequency and intensity of attacks in epilepsy.

Agar-Agar—Japanese Isinglass. Is in membrane-like strips, consisting of the dried jelly of *Gelidium corneum*, a sea-weed. Another variety comes from Borneo. Agar U.S. is described as the dried mucilaginous substance extracted from Gracilaria Lichenoides, but it is not that species which yields Agar-Agar used in medicine. It would be more correct to define as from several species of Gelidium (Class Rhodophyceæ)—E. M. Holmes, P.J. ii./16,484; see also ii./06,319; 1 in boiling water 200, forms on cooling, a transparent jelly, suitable for invalids. It has little nutritive value—it is not digested—but is useful for treating constipation, especially of the type where the stools are hard and dry owing to complete absorption of liquid from the digestive tract. For this purpose it is best crushed into small pieces like bran—termed **Flaked Agar.** Clinical experience shows that finely powdered or even sand-like powder is not efficacious. Teaspoonful doses occasionally of the dry substance in flake form sprinkled in little moist food, *e.g.*, stewed apples, act as mild aperient in that it softens the fæces, but should be employed at first in moderation, as it may possibly cause obstruction. By taking up moisture it increases the volume of the fæces and promotes peristalsis.—*See* Cascara Jelly, also. It is used in preparation of culture media for bacteria (*q.v.*); also for finishing calicoes, silks, &c.

Method of inducing young children to take Agar. Cut up into flakes about the size of bran and cook with cereal food. Most will take it in this way, others will take it in broth or soup if thoroughly cooked before mixing in. Several hours hard boiling are required before it becomes homogeneous enough to mix well, otherwise it will be detected by the child. Children of 4—5 years need as a rule about 1 drachm.—P.J. ii./10,491.

Vanilla, Almond and **Raspberry** flavored **Flaked Agar** are prepared.

Linseed appears to act, as regards weight yield of fæces, better than Agar Agar.—88% increase against 48%, but not so well as Psyllium, 97%. Did not depend on humidity.—B.M.J.E. i./14,59.

Avarin—A carbohydrate containing but starch-free Agar preparation for use by diabetics.

✱**Thaolaxine** (T.M. 319983), described as Agar Agar with Rhamnaceous Extracts, in form of Scales, Cachets, Tablets and Granules. A laxative in treatment of chronic constipation—L. ii./12,1445.

✱**Laxase** (T.M. 361997). Agar Agar in tablet form also made with phenolphthalein $\frac{1}{4}$ grain, Beta-naphthol 1 grain, Cascara Extract $\frac{1}{2}$ grain, and with Lactic Acid Bacilli.

✱**Jubol** (T.M. 313263). Tablets of Agar-Agar with biliary and intestinal glands extract. *Dose.*—3 tablets at bedtime.—Gehe.

Agaricus Albus.—*Syn.* Polyporus Officinalis, Boletus Laricis, Fungus Laricis (P. Austr.), **Polypore de Melèse** (Fr. Cx.). Purging Agaric. *Dose.*—10 to 30 grains. Light, spongy pieces. Large doses purgative, small ones astringent for night sweats, diarrhœa and to diminish bronchial secretion. Tincture 1 in 10 of 60% alcohol. *Dose.*—20 to 60 minims. **Extract**—*Dose.*—$\frac{1}{2}$ to 2 grains. Prepared by exhaustion with 60% Alcohol, yield is about 6%.

Not to be confused with the fly agaric, Amanita Muscaria, which contains [P1] **Muscarine.** Various substances have been identified with the name Muscarine, at least three, with the formula $C_5H_{15}NO_3 = 137{\cdot}155$. The original Muscarine was found in Amanita Muscaria and had the composition $(CH_3)_3N.OH.\ CH_2CH\ (OH)_2$.

It has been stated to have an action on the heart, being a muscular poison, and to be antagonistic to Atropine. See also 15th Edn., p. 795. At present it is not obtainable commercially.

Acidum Agaricum. Agaricin P.G.V., Helv. and Jap, and Dan. $CH_2C(OH)(CH)(C_{16}H_{33})(COOH)_3 1\frac{1}{2}H_2O = 443{\cdot}454$. *Syn.* Laricic Acid. *Dose.*—$\frac{1}{8}$ to $\frac{1}{2}$ grain is given to restrain the sweating of phthisis. Max. Single dose (P.G.) $1\frac{1}{2}$ grains. **Bismuth** and **Lithium Agaricinates** are described.—F.N., 1906,15.

Argimonia Eupatoria (*Rosaceæ*).—Common agrimony. Mild astringent.

Elixir Agrimoniæ Compositum (Lunan). A special preparation of agrimony, rhubarb, toad-flax (*Antirrhinum Linaria*), barberry, caraway, chamomile, dandelion, parsley, is in demand in incipient appendicitis; stated to avert an operation, and in any condition of the stomach and alimentary canal likely to produce inflammatory symptoms. *Dose.*—1 drachm in water thrice daily; as hepatic stimulant: mild astringent. **Mistura Agrimoniæ Composita.** *Dose.*—$\frac{1}{2}$ ounce thrice daily, is of similar composition for gallstones, and to prevent their formation—stated to prove effectual **Capsules** are also made.

Agropyrum, Triticum (*Off.*) or Couch Grass. Dried rhizome of *A. repens* (*Triticum repens*). Contains triticin, a carbohydrate similar to inulin. Useful in gonorrhœa. Diuretic and aperient.—Pg. I. iii. 50. Decoctum (*Off.*). *Dose.*—$\frac{1}{2}$ to 2 oz. Prepared with Water, 1 in 20. Ext. Liq. (*Off.*) *Dose.*—1 to 2 dr. Made 1 = 1 with boiling water, and 25% of alc. 90%. *Flavouring.*—Syl Lavandulæ; Aqua Anethi.

Triticum Repens (genuine) is a commercial rarity. The chief, if not the only substitute is the rhizome of *Cynodon Dactylon*, the dog grass. Spain is apparently the geographical source of the material of commerce.—J. Small, B.P. Conf.,,1919.

Alchemilla Arvensis (*Rosaceæ*). Parsley Piert. Small annual plants with green flowers. Is superior to buchu in some instances. Infusion of leaves 1 in 10. *Dose.*—1 to 2 ounces.

Aletris Farinosa, B.P.C.—Star Grass (Colic Root). From the rhizome of this are prepared a fluid Extract with diluted alcohol, U.S. (1890, 1=1) *dose.* 5 to 15 minims, and a Cordial or Elixir (B.P.C. containing Liquid Extract of Aletris 25, Liquid Extract of Liquorice 6, Simple Elixir 45. Water to 100), *Dose.*—$\frac{1}{2}$ to 1 drachm, are used as uterine tonics. **Extractum Aletridis Liquidum, B.P.C.** 1 = 1 by percolation with Alcohol 45%

✱**Alginoid** (T.M. 279707) **Iron.** *Syn.* ✱Algiron (T.M. 283697).—*Dose*, 2 to 15 grains. Alginic Acid from seaweed is combined with iron, forming an insoluble brown powder containing about 11% of iron. Does not constipate: is given for anæmia. Pills and pellets are prepared. Also compound pills. Algiron 2 gr. with Extract Cascara $\frac{1}{8}$ gr.; with Ⓟ Cascara Extract $\frac{1}{4}$ and Nux Vomica Extract $\frac{1}{8}$ gr.; [P1] Arsenic $\frac{1}{100}$ grain; [P1] with Arsenic $\frac{1}{100}$ grain and Strychnine $\frac{1}{100}$ grain; [P1] with Quinine 1 grain and Strychnine $\frac{1}{50}$ grain; and Ⓟ with Nux Vomica Extract $\frac{1}{8}$ grain and Zinc Valerianate 1 grain. **Cupri Alginas.** *Dose.*—$\frac{1}{24}$ to $\frac{1}{6}$ grain. A green powder. Used in lupus, leprosy, cancer and anæmia.—B M.J. i./06,1464.

Allium Sativum.—Garlic bulb. U.S. (1890). *Dose.*—½ to 2 drachms. Useful in cases of dilated bronchi with fetid expectoration; expectoration and fetor lessened. **Succus.**—*Dose.*—10 to 30 minims. Extract = inspissated juice. *Dose.*—4 to 10 grains. Pill contains 4 grains extract. In pulmonary phthisis it often diminishes cough and expectoration ceases, lessens night sweats, improves appetite, weight is gained and sleep becomes regular under its continued use. In bronchiectasis.—B.M.J. i./06,83. The juice to allay nervous vomiting.—H.

Oleum Allii Essentiale.—This Oil is excreted through the lungs and skin—not apparently by the kidney. It has no solvent action on Uric Acid. Its principal constituent is usually taken to be Allyl Sulphide $(C_3H_5)_2S$ = 114·15. The leek contains no other active principle.—B.M.J. ii./11, 609—but statements to the contrary are given in some text books. Stimulant, expectorant and stomachic. In chronic bronchitis, pneumonia, nervous affections, also in cholera, tuberculosis, hysteria, &c. Allyl Sulphide can be made by interaction of Alcoholic Potassium Sulphide with Allyl Iodide. *Dose* of either the Natural Oil or Allyl Sulphide, ½ to 2 minims, in **Capsules.** ½ minim of Allyl Sulphide per kilo body weight may be taken as lethal dose. —B.M.J. ii./11,609.

Laryngeal tuberculosis treated by ½ to 1 drachm, two or three times a day, of the Garlic Juice with Tinct. Lavand. Co. and Syrup. Simplex, also gargle or spray (or combined), or for internal use, accompanied by poultice (or blister) of pulped garlic externally, latter also to tuberculous ulcers. Fresh juice is not so severe in action as the pulped garlic—yet not so rapid in effect. The juice should never be applied to broken surfaces. Lengthy application of poultices (3 to 4 weeks with changes) may be required, but effect should first be tried for a few hours, as some are more susceptible than others. It is held by W. C. Minchin (B.M.J. ii./12,460) who advocates the treatment, that Allyl Sulphide is specific in all tuberculous lesions in accessible situations, or in those which can be rendered accessible. Thus every case of tuberculous disease in the leg, foot, arm, hand, testicle, etc., gets well under Allyl Sulphide treatment. Allyl Sulphide stated to have high germicidal power.

The following were finally adopted as modes of treatment:—

Emplastrum Allii.—Fresh garlic *q.s.*, pulped, 2 lbs., to this add ¼ lb. lard warmed to a cream, and mix thoroughly. Spread on thin butter-muslin and apply to the part, changing the dressing about every 24 hours.

Unguentum Allyl Sulphidi, *Martindale.* 0·1%—increased in strength if desired—in Adeps Anseri Benzoatus, could replace above as being more expeditious to prepare.

Inhalation.—Fresh Garlic Juice 56, Alcohol (90%) 7, Eucalyptus Oil (*var.* Citriodora) (Bayard) 1. 4 ounces is sufficient for three weeks treatment of pulmonary tuberculosis. The juice is *fresh* and *not filtered.* Patient to use inhaler at least 1 hour night and morning. **Capsules of Allyl Sulphide,** 2 minims, can be used in addition if practicable.

For lupus apply the fresh juice at night and allow to dry, wash off in morning and apply a bland ointment.

Where a strong antipathy to the taste of Garlic exists, its use in any form has failed to give relief.—W. C. Minchin, "Treatment, Prevention and Cure of Tuberculosis and Lupus with Allyl Sulphide."

The Inhalant is stated to be ideal for use in a respirator (Minchin's). In a case described the quality of sputum improved in a week, cough became useful and less wearisome. A large tuberculous cold abscess in the scapular region improved under the inhalant, but the internal pressure of the abscess contents resulted in a sinus forming through a needle hole (previous aspiration) and a chronic discharge followed. The effect of Allyl Sulphide was magical. —B.M.J. ii./12,880.

With regard to the ***Antiseptic Power*** of Allyl Sulphide, we have determined the ***Carbolic Coefficient,*** *vide* Vol. II. The substance is a little more potent than Phenol.

Suppuration of wounds controlled by Succus Allii diluted with 3 or 4 parts Distilled Water. Notable improvement in 48 hours. A case of empyema remarkably cleaned out with this lotion. Stronger than this (1 with 2 of water) caused pain. Later 1 with 9 of water used when suppuration definitely controlled.—V. Gabriel, L. ii./15 603.

W. C. Minchin adds he has used Allium preparations in treatment of suppurating wounds and foul ulcers for 15 years with satisfaction. Used 1 diluted with 3 it will not blister. Used "conc." it does. Internally it is the best intestinal antiseptic. It is a veritable sheet anchor in many fevers.—L. ii./15, 888.

Whooping Cough treated by Garlic either eaten chopped up or under the soles of the feet between two pairs of socks, but the juice *per os* is more convenient.—T. Mark Hovell, B.M.J. ii./16,15; i./17,284.

Duodenal ulcers have been successfully treated by rectal injection of the juice diluted with three times quantity of water.

Hydrarthrosis has been cured by placing the fleshy scales of the onion round the joint and keeping in place with a bandage.

Allium Porrium.—The common leek also contains Allyl Sulphide.

Alnus Glutinosa.—The common Alder. *Uses.*—Astringent and tonic. Contains about 20% of Tannin. *Liquid Extract* 1 = 1 of the bark. *Dose.*—10 to 30 minims. Made by percolation with 45% Alcohol. Set aside the first portion, percolating (⅘ of the whole), and continue percolation with remainder of the Alcohol, concentrate and add to reserve portion. Was recently advocated in cancer. A Liquid Extract of the leaves, prepared by boiling with water and adding Alcohol *q.s.* to preserve, has also been used.—Medical Mag., May, 1907. In 140 cases of cancer pain, cachexia, and exhaustion diminished.

Alstonia constricta, *Off.*—Bark used in Australia as a febrifuge. *Dose,* in powder, 5 grains. A crystalline alkaloid, Alstonine or Chlorogenine, $C_{21}H_{20}N_2O_4,3\frac{1}{2}H_2O = 427{\cdot}341$, has been isolated from it. Tincture, *Off.*, 1 in 8 Alcohol 60%. *Dose.*—½ to 1 drachm. Should be less, 5 to 20 minims. Influenza well treated by Tincture, 10 minim doses.—L. i./01,399; P.J. i./01, 362. Three other alkaloids exist in it. A mild diaphoretic. When prescribing the tincture that of *A. constricta* should be specified.—L. i./03,375.

Alstonia scholaris. *Off.*—Dita bark, from India and the Philippines, contains amongst others an alkaloid, Ditaine, *syn.* Echitamine, $C_{22}H_{28}N_2O_4$ and the milky juice of the tree forms a substance resembling gutta-percha. Tincture, *Off.*, 1 in 8 Alcohol 60%. *Dose.*—½ to 1 drachm.—P.J. i./01,362. *Off.*—These two drugs are under one monograph.

Infusion,—*Off.*—1 in 20 boiling water.

Tonic in malaria, in chronic diarrhœa and advanced stages of dysentery.

Althæa. Marshmallow, dried root of *Althœa officinalis, Linne* (*Malvaceœ*) from second year's growth and deprived of the periderm. Contains Asparagin, *q.v.* Is mucilaginous and used in pill making to give 'body' and support.

Amadou.—Oak agaric, Surgeons' agaric, Touchwood. *Polyporus fomentarius* L. A fungus prepared with alkali and nitre, in light brown elastic pieces employed as a mechanical hæmostatic. It is included in P. Austr. under the name *Fungus igniarius*.

Ambergris. A substance found floating on the surface of the sea—in southern hemisphere, valued for its perfume which is generated on keeping in a closed receptacle for a year or so, generally believed to be an intestinal product from the sperm whale.

A sample, 'possibly genuine,' had M. pt. 75° C. with a small amount of substance which did not melt at 100° C. It was of grey colour with little odour. It was soluble to extent of 93·8% in Petroleum Ether which extract had Ref. Index (70°) 1·495, Iodine No. 107·1, Acid value 1, Sap. No. 4·4; this portion presumably containing the Ambrein was soluble in absolute Alcohol on warming and melted to a clear sticky amber liquid at 42° C.—all of which figures are scarcely those of the adulterant ozokerite.—Evans' Anal. Notes, 1911.

Amylene. *Syn.* Iso-Amylene. $C_5H_{10} = 70{\cdot}105$. ***Manufacture.***—Wash Fousel Oil (B.pt. about 130° C.) with equal volume of salt solution by shaking—this removes Ethyl, Methyl, etc., alcohols. Draw off the upper layer, dry with Calcium Chloride and distil, collect distillate which comes over at 130° C. Mix with twice its weight of fused Zinc Chloride and allow to stand at ordinary temperature three days. (The process is simply one of dehydration, $C_5H_{12}O = C_5H_{10} + H_2O$). Distil on water bath—it boils at 40° C. Collect the fraction coming over at 40 to 60° C. into ice and redistil

Amyleni Hydras. *Syn.* DIMETHYL-ETHYL CARBINOL, TERTIARY AMYL ALCOHOL $(CH_3)_2 : C(OH)C_2H_5 = 88{\cdot}121$. *Dose.*—30 to 80 minims, flavoured with liquorice. P.G. has maximum single dose 4·0 Gm. Maximum in 24 hours 8·0 Gm.

☞ ***Manufacture.***—Shake in a closed vessel equal volumes of Amylene, Sulphuric Acid, and water in a freezing mixture for 30 to 40 minutes. Separate any undissolved Amylene. Dilute the acid liquor with two vols. of ice cold water and filter through a filter moistened with water. Neutralise with Sodium Hydrate and distil. Tertiary Amyl Alcohol comes over with a little water. Dehydrate with fused Caustic Potash. Rectify and collect the fraction 99—103° C.

A colourless liquid, of pungent taste and odour, resembling a mixture of paraldehyde and camphor. Soluble in 8 parts of water, also in alcohol. Sp. Gr. 0·815 to 0·820, B. pt. 216° F. Hypnotic, occupying a position between chloral and paraldehyde.

Capsules contain 10 minims in each. *Dose.*—3 to 6.

Owes hypnotic power possibly to alkyl groups. Dimethyl carbinol is twice as weak as this Dimethyl-ethyl Carbinol and tri-ethyl carbinol is still more powerful.

In puerperal eclampsia intramuscular injection of 3 to 4 Gm. into the gluteal region produced good result.—M. '03,129.

3 drachms, suspended with Tragacanth Mucilage ½ ounce, flavoured with Licorice and made up to 2 ounces for the dose, have been given as a night draught.—B.C.D. i./14,70.

Six women died in Bethlem Hospital through getting pure amylene hydrate in place of a draught. The dispensing was done by a medical man.—C.D., Nov. 21/14.

Amylene-hydrate Carbamate. $NH_2.CO.OC(CH_3)_2.C_2H_5 = 131·144$. *Syn.* **Aponal.**

Dose.—15 to 20 grains (30 max.) mild hypnotic. Stated to induce easy and calm sleep in 20 to 30 minutes, also to be free from ill effects on gastro-intestinal tract or other organs. Suggested for use in insomnia due to nervous debility and other causes, and to replace powerful hypnotics in these cases.—*See* also L. ii./11,1412.

Said to be made by action of Urea Hydrochloride on Amylene Hydrate (Dimethyl-ethyl-carbinol).—P.J. ii./11,442. B.M.J. i./12,733.

Amylene-Chloral, $CCl_3.CHOH.OC_5H_{11} = 223·489$. — *Syn.* ✱DORMIOL (T.M. 228811) a 50% solution; DIMETHYL-ETHYLCARBINOL-CHLORAL. *Dose.*—5 to 50 minims (0·3 to 3 Cc.).

May be prepared by mixing 100 parts of Anhydrous Chloral with 60 parts of Amylene Hydrate. It is an oily liquid slowly forming a clear solution with an equal quantity of water. Soluble at once in large quantities of Water, miscible with Alcohol, Ether and Fixed Oils. Sp. Gr. 1·24, boiling point 93° with decomposition. Absence of Free Chloral is shown by the non-reduction of Ammoniated Silver Nitrate Solution.—P.J. ii./10,392.

Capsules contain 8 minims (0·5 Gm.). Hypnotic which may be used alternating with others.

Amylum—Starch is obtained from the common wheat (*Triticum Sativum*). maize (*Zea Mays*), rice (*Oryza Sativa*), and potato (*Solanum Tuberosum*, *N. O. Solanaceæ*).

Anacardium occidentale.—Cashew Nut. The pericarp of this contains a vesicating oily liquid, which consists of 10% of Cardol (to which the vesicating properties are due), and 90% of Anacardic Acid, $C_{22}H_{32}O_3 = 344·366$. The oil has been used in leprosy, ringworm, ulcers, corns, and internally as a vermifuge. Tincture, 1 in 10 Alcohol 90%. *Dose.*—2 to 10 minims. **Anacardii Folia** are in **Ph. Ned.** The marking nut, from *A. Officinarum*, possesses similar properties.

Ananassa Sativa (Pine Apple) contains a free acid,—the distribution of this acid is unequal, it is said to be present in a large amount near the cuticle and almost entirely absent in the tissue at the centre. It also contains Bromeline, a ferment which is not stable. It has been used among the natives in South Africa for diphtheria and diphtheritic sore throat.

Tinctura Ananassæ (Sativæ). *Dose.*—(As digestive) 25 to 30 minims with meals, is prepared by macerating Ananassa Sativa 1 for three weeks in Alcohol (90%) 1¼, adding Glycerin 2 and making up to 4 with Alcohol 90%. After tonsillotomy, painted or sprayed on, prevents the formation of even the most minute suspicion of membranous looking exudation, and the stump heals in four to six days. Also useful in chronic tonsillar abscess. Bacteriological examination showed it to have good effect on Strepto- and Staphylo- infection of the throat. May also prove of value as digestive.—Craik Taylor.

Pineapple Juice is said to be a reliable vegetable ferment for dissolving necrosed tissue in quinsy, tonsillitis, boils, etc.; recurrent urethral gonorrhœa where there is a copious discharge may yield promptly to injections (diluted at first).

Anchusa Officinalis (*Boraginaceæ*) **Alkanet,** causes the heart to stop in diastole, it yields 5 to 6% red amorphous resin "Alkannin," and contains two red substances of acid nature, has some relationship to action of Curare —*q.v. v.* L. i./06,974.

Anethi Oleum—Distilled from fruit of *Peucedanum graveolens*. It is a yellow oil with odour resembling caraway. Sp. Gr. 0·900 to 0·920 approx. Soluble 1 in 3 of 90% alcohol. Some normal distillates of dill-fruit have a lower Sp. Gr. than 0·905, but, since the oil is for medicinal purposes, and the carminative principle is carvone, a high proportion of the latter should be ensured by the minimum Sp. Gr limit indicated. A high Sp. Gr. should put the analyst or user on his guard for admixture with caraway oil.—Umney

Anhalonium Lewinii.—Mescal Buttons, the tufts of young leaves of the plant are eaten by the Mexican Indians to produce intoxication accompanied by visions. Effects due to alkaloids, $\boxed{\text{P1}}$Anhalonine, $C_{12}H_{15}NO_3$ = 221·19, and $\boxed{\text{P1}}$Mescaline, $C_{11}H_{17}NO_3$(?) = 211·201. $\boxed{\text{P1}}$Mescaline is the principle to which the peculiar visual hallucinations are due.—Pr. lxi. 1. Effects of Mescal.—P.J. ii./99,357.

A liquid extract of commerce diluted on an empty stomach had no effect in 50 minims. *Dose.*—100 minims, however, in 15 minutes produced slight dyspnœa and transient headache, then intermittent tetanoid spasms in hands and feet, with sensation of general *bien aise*. A sense of egotistical concentration with delightful feeling of irresponsibility to one's surroundings succeeded, and lasted in all eleven hours. No spectral illusions, however, nor vertigo, nor subsequent drowsiness. Heart accelerated.—Bernard Smith, B.M.J. ii./13,21.

Anisi Fructus (*Off.*). Anise. Dried ripe fruit of *Pimpinella Anisum*, Linn. (*Umbelliferæ*). Contains **Oleum Anisi** (*Off.*) which is also distilled from the Star Anise (*Illicium verum*, N.O. *Magnoliaceæ*), the latter being that used almost entirely in this country. *Dose.*—½ to 3 minims. Aromatic and carminative. Colourless or yellowish oil congealing between 10 and 15° C. Sp. Gr. at 20° C., 0·975 to 0·990. **Aqua Anisi** (*Off.*).—Anise Fruit 1 pound, Water 2 gallons. Distil ½. **Spiritus Anisi** (*Off.*).—1 in 10 in Alcohol 90%. *Dose.*—5 to 20 minims.

Anise Oil.—A sample was adulterated with 40% Petroleum Oil.—E. J. Parry, C.D., 1912,81,372; Y.B.P., 1913,68.

Eau de Botot—Anise Oil 20, Peppermint Oil 13, Saffron Tincture 5, Alcohol 70% to 1,600. Some formulæ contain Cinchona, Rhatany, Cloves, &c.

Anethol (**P. Belg., P. Austr., Ph. Ned., P. Jap.**). $C_{10}H_{12}O$ = 148·146. The stearoptene from the Anise Oils melts at 20° C., B.pt. 230° C. Soluble in Alcohol 90% 1 in 3 approximately. *Dose.*—½ to 2 minims.

In infantile colic 1 to 2 minims of Anise oil followed by a teaspoonful of castor oil, is all that is needed.—Whitla Pract. Med.

Anthemis nobilis.—*Syn.* 'English' or 'Roman.' Chamomile Flowers (*Compositæ*). The largest, most 'double,' and whitest flowers are preferred. Tonic, aromatic, stomachic, emetic in large doses. In addition to the Extract, B.P. '98, *dose* 3 to 8 grains, Infusion, and Oil, a Tincture, 2 of single fresh flowers in Alcohol (90%) 3, and Water 1, are made. The latter is used for summer diarrhœa of children. *Dose.*—3 to 10 minims.

Oleum Anthemidis.—Distilled from the flowers of the Roman chamomile. Sp. Gr. 0·905 to 0·915, (*Off.*). Soluble in less than its own vol. of 90% alcohol.

'German' Chamomile Flowers are those of *Matricaria Chamomilla*. They have a hollow conical receptacle and no bracts, whilst *A. Nobilis* flowers have solid receptacles and are densely covered with concave, blunt, narrow scaly bracts.

Anthoxanthum odoratum.—Sweet Vernal Grass. Flowers develop odour of coumarin on drying. Tincture, 1 of fresh-flowering herb in 10 of 40 O.P. spirit (making allowance for the moisture the plant contains). *Dose.*—2 to 6 minims internally and diluted as a nasal lotion for hay fever.

Apis Mellifica.—The Honey Bee. A Tincture—*Dose* 1 minim hourly, is prepared, which is said to have effect in relieving urticaria.—Leonard & Christy's Dict. Mat. Med. See also Acid Formic.

Arachis Hypogœa. (*Syn.* Pea Nut, Gound Nut, Goober Nut, Manilla grain, Chinese Almond).—The seeds of the plant form the 'pea nuts' of commerce. Have dry, brittle envelope and yellowish-white kernel. Very rich in a non-drying oil (40 to 50%) which is *Off.* with Sp. Gr. 0·916 to 0·921. Ground down employed as cake for cattle. Very nutritive.—See also P.J. ii./11,434.

Eating the kernels causes a desire to drink.—L. i./17,670.

Arbutin, $C_{12}H_{16}O_7 + \frac{1}{2}H_2O$ = 281·196.—A crystallised glucoside obtained from the leaves of *Arctostaphylos Uva-ursi* (*Ericaceæ*) U.S. (Fluidextractum 1=1 Glycero-hydro-alcoholic), Bearberry, and other ericaceous plants. Soluble 1 in 8 in cold water. It is given for chronic cystitis and vesical catarrh, in dose of 5 to 15 grains with sugar ; is not poisonous. Liquid. extract of Uva Ursi leaves, *dose*, 20 to 40 minims, is preferable, the Infusion (*Off.*) has 1 ounce to 1 pint of boiling water. Antiseptic ; also as vermifuge for dogs 60 to 100 grains. Arbutin, given *per os* is partly decomposed with formation of Hydrokinone but most of it is absorbed by the kidneys.—Dixon. ✱**Vesicaesan** (T.M. 334585) **Pills.**—*Dose*, 6 to 10 pills four times daily. Contain a preparation of the leaves.—L. ii./13,1069.

Preparation of True Arbutin. Commercial arbutin (containing methylarbutin) 15 Gm. are dissolved in Alcohol 95% (500 Cc.) and treated with 10 Gm. of KOH in Alcohol 125 Cc. When clear, the supernatant liquid is removed. and the crystalline precipitate washed with alcohol (20 Cc.), dissolved in 75 Cc, of boiling alcohol and acetic acid (20 Cc.), and treated with $CaCO_3$ (5 Gm.) After removing the alcohol, the residue is lixiviated with water (100, 50, and 50 Cc.). The filtrate is treated with $CaCO_3$ (2 Gm.), evaporated to dryness, and the product crystallised from Ethyl Acetate. Pure arbutin crystallises with 1 H_2O, and is identical with the glucoside obtained from the pear tree by Bourquelot (see J.C.S.A. ii./10,742). The anhydrous substance has (αD)—63·45°.—J.C.S.A. i./10,692.

Busserole Fr. Cx. = Uva Ursi Folia.

Infusum Uvæ Ursi Concentratum, B.P.C. by *b.* process *p.* 490. *Dose.*—$\frac{1}{2}$ to 1 drachm.

✱**Cellotropine** (T.M. 304700), Arbutin - Benzoic - Ether, $C_6H_4.OC_6H_{11}O_5.OCOC_6H_5$=376·255 $\frac{1}{2}$ to 1 Gm. (= 1 'teaspoonful') thrice daily, or even up to 5 Gm. in phthisis.—F.N., 1909,54. *C.f.* P.J. ii./07,85.

Areca, Semen Arecæ, P.G. iv. Betel Nut. B.P. Add 1874.—From *Areca Catechu* (*Palmaceæ*). *Dose.*—1 to 4 drachms. Is astringent, and is used as a vermifuge, especially for dogs ; is also used as a masticatory and added to dentifrices. Contains several alkaloids, the most active being $\boxed{\text{P1}}$ **Arecoline** (about 0·1%). $C_8H_{13}NO_2$ = 155·154, a liquid which forms a crystalline soluble $\boxed{\text{P1}}$ **Hydrobromide** P.G.V., Fr. Cx , P. Helv., P. Hung., $C_8H_{13}NO_2,HBr$ = 236·082. Fr. Cx. gives maximum single dose 0·0005 Gm. $\frac{1}{120}$ grain approx., and maximum daily dose 0·0015 Gm. ($\frac{1}{40}$ grain), approx. Its physiological action is allied to that of pelletierine and pilocarpine. Taken internally, causes vomiting and diarrhœa.—B.M.J.E. ii./90. 15. Is sialogogue and diaphoretic.—B.M.J.E. ii./95,99. Resembles physostigmine as a myotic, 1% solution suitable. Serviceable in glaucoma.

Cancer occurring in the mucous membrane of the cheek apparently connected with chewing of a quid of betel leaf, areca nut, slaked lime, and tobacco leaf.—B.M.J. ii./08,1428.

Tenaline, a liquid specialty, used in veterinary practice; is an efficient vermifuge. *Dose*, 1 minim for each pound of the weight of the dog.--B.M.J.E. i./98,35.

Arnicæ Flores *Off.*—*A. montana.* Dried flower heads. Acrid stimulant equivalent in effects to Arnica rhizome.

Tinctura, *Off.*—*Dose.*—$\frac{1}{2}$ to 1 drachm 1 in 10 Alcohol 70%.

Arnica dermatitis.—Arnica often used by the public for bruises and injuries but may produce dangerous rashes. Under saline purges and sedative ointment rash and irritation subsided.—B.M.J. ii./12,1707.

Arum Maculatum.—The berries of the plant known as "Lords and Ladies" act as an irritant poison causing excoriation of the mouth and sometimes bleeding and convulsions, and the tongue sometimes swells so as to fill the mouth and prevent swallowing. The swelling is best reduced by bleeding. For further details of the plant see a description by E. M. Holmes.—P.J. ii./15,324.

Succus Ari prepared from the leaves. *Dose.*—1 drachm. Has been used in neuralgia.

Asafetida.—Gum resin obtained by incision from the root of *Ferula Fœtida* and probably other species. Coat pills first with mucilage and afterwards with Pill Varnish to cover the odour—not with silver, which would blacken. Nervine stimulant, relieves hysteria, flatulence of typhoid, and enteritis. **Emulsum Asafœtidæ,** U.S. Asafœtida 40, Water to 1,000. **Enema Asafetidæ,** L. H. Tincture of Asafetida, $\frac{1}{2}$ ounce. Starch Enema to 4 ounces. Tincture (*Off.* and '98). 1 in 5 Alcohol 70%. *Dose.*—$\frac{1}{2}$ to 1 drachm. U.S. 1 in 5. *Average dose.*—15 minims. ***Flavoring.***—Syl Menthæ Piperitæ, Syl

Limonis, Syl Coriandri ; Syrupus Zingiberis not much good. **Liquor Antihystericus.**—*Dose.*—½ to 1 drachm. On the Continent a mixture is used of Camphorated Spirit of Ether and Asafetida Tincture equal parts.

Detection of Gum Ammoniacum and Gum Galbanum in Asafetida.—Am. Jl. Ph., Dec., 1910, p. 575 ; Am. Jl. Ph., Jan., 1912, p. 4.

Threatened appendicitis. Flatulent distension often remarkably improved by moderate dose of castor oil combined if necessary with enemata of Turpentine and Asafœtida. Change in iliac swelling often effected.—B.M.J. i./09,1285.

The oil from the 'tears' differs greatly from that of the lump. That from the former contains about 5 times as much sulphur (10 and 2% respectively). The oil from both may be about 12 to 16%—that from the tears usually is lower than the lump.—P.J. ii./10,120, 147.

The Lead Number of Asafœtida as Mode of Assay.—The Sulphur content in the Oil expressed as percentage of the real gum-resin is the essential fact—or in judging whether it is genuine.—E. F. Harrison, P.J. ii./12,140 ; i./13, 218,276 ; C.D. i./13,271.

Asclepias incarnata.—White Indian Hemp rhizome. Is a speedy, potent and reliable diuretic.—Pr. xxiii. 141. Tincture, 1 in 10. *Dose*, 5 to 40 minims.

Asclepias tuberosa.—Pleurisy Root. Is expectorant and diuretic. Tincture, 1 in 10. *Dose.*—5 to 40 minims.

Asparagin. *Syn.* ALTHEIN. Amido-Succinic Acid Amide. $C_2H_3(NH_2 (COOH). (CONH_2), H_2O = 150{\cdot}12$. *Dose.*—1 to 2 grains. White crystals, having a slight acid reaction. May be obtained from *Asparagus officinalis*, and the roots of liquorice, belladonna, &c. Soluble 1 in 50 of water, also in acid and alkaline solutions. Insoluble in absolute alcohol and ether. An aqueous solution dissolves freshly precipitated mercuric oxide, and is recommended for hypodermic injection in syphilis. Has decided diuretic effect. For cardiac dropsy and chronic gout one grain is given three times a day.

Avena Sativa.—Tincture of the oat, 1 in 5 made with 60% alcohol, in 20 minim doses recommended to relieve pruritic condition induced by eruption in dermatitis.—Fox, Photog. Atlas of Diseases of Skin, vol. ii., p. 66.

Azadirachta Indica. The bark was *Off.* in I.C. Add. generally called *Melia Azadirachta.* *Syn.* **Nim or Neem, Margosa,** is common throughout India—mostly planted. In malaria its efficacy is very doubtful.—I.D.C. 1916.

Margosic Acid.—From Oil of Margosa Seeds. The Sodium and Potassium Salts being soluble can be given *per os.* The Calcium and Zinc Salts for local use in skin affections.—Chatterjee & Ray, Ind. Jl. Med. Res. 1918, 5,656 abst., Y.B.P. 1919, 182.

Balsamum Gurjunæ.—Gurjun Balsam, Wood Oil. *Dose*, ½ to 2 drachms. A greenish fluorescent balsam from the trunk of the growing tree *Dipterocaprus turbinatus* and other species of this genus ; imported from the East Indies. Has aromatic odour and taste, and has been used as an adulterant of copaiba. It is not completely soluble in either ether or alcohol. Used with success for gonorrhœa, and as a liniment for leprosy ; also in emulsion with lime-water, which is given freely internally. As an expectorant, given with malt extract.—L. i./90.962. To test for *vide* Copaiba.

Balsamum Peruvianum. (*Off.*) *Dose*, 5 to 15 minims. From trunk of *Myroxylon Pereiræ*, U.S. *Toluifera Pereira* (*Leguminosæ*). A viscid liquid insoluble in water, soluble in chloroform, absolute alcohol, and glacial acetic acid ; slightly in ether and petroleum benzine. Contains Cinnamein and Cinnamic Acid. Sp. Gr. between 1·14 and 1·158. "Synthetic" Balsam, recently placed on the market, may be detected by shaking 2 Gm. with 10 Gm. of Petroleum Spirit. Evaporate the Petroleum Solution on a water bath, dry on same 10 minutes, cool, and add three drops Nitric Acid 1·38. Mix. Peru balsam gives a golden yellow colour. Inhalation of a few drops of vapour 1 in alcohol 2 in a little hot water useful in pharyngitis. As a dressing in war ; may be left on wounds, if aseptic, for 20 days if necessary. Scabies has been satisfactorily treated with a paint of Balsam 3, Glycerin 1. But test for albumin in urine both before and during treatment. **Balsamum Lanolinatum.**—Lanolin 5,000, Vaselin 2,000, Balsam Peru 12, Otto 4.—Ph. Notes (Denmark). C.X. has **Unguentum Balsami Peruviani.**—Peruvian Balsam 1, Lard 9. Wyatt Wingrave's formula : Balsam of Peru 20, Trikresol 5, Vaselin *q.s* to 100. Mix warm. Ⓟ Lotio Balsami Peruviani.—MacNaughton Jones uses as application to the hair (excellent in alopecia) a preparation of **Peru Balsam 1 drachm, Spirit of Rosemary 1 ounce, Tincture of Cantharides**

4 drachms, Pilocarpine Nitrate 2 grains, Almond Oil 1 ounce. This is applied at night, and washed off next morning with a borax and spirit lotion.

Peru. Tolu Balsam and Storax compared.—Allen, 1910, Vol. III., p. 454.

Recommended for use in dentistry.—C.D. i./10,152.

Good results in accidental wounds and in compound fractures were obtained by the application of Balsam of Peru—the wound may do well even when the skin is very septic. It gives rise to hyperæmia in wounds. The Balsam is simply poured in. It may be that wounds should not be dressed too often.—L. ii./11,442; B.M.J.E. i./12,30.

For scabies an ointment containing Peruvian Balsam and Sublimed Sulphur 4½% of each, in Soft Paraffin.—W. Knowsley Sibley (Treatment of Skin Diseases.)

Menciere's Solution, *q.v.* contains Peruvian Balsam.

Perugen.—A preparation containing 60% of Cinnamein. Employed as an application to wounds and in skin affections.—L. ii./13,1069.

Cinnamein in Balsam of Peru, Estimation of.—Place Water 5 Cc. with Balsam of Peru 2·5 Gm. in a 75 Cc. bottle, add Ether 30 Gm. and shake a minute, then add Sodium Hydrate Solution 5 Cc. and shake again 1 minute. Cork bottle well and set aside, inverted, for 10 minutes. Carefully remove cork and pipette off about 3 Cc. of the aqueous layer. Then add Tragacanth Powder 0·5 Gm., shake, and after 5 minutes transfer the ethereal layer into a tared, wide-mouthed flask, and note its weight (y). Distil off the Ether, dry the residue at 100° for 30 to 45 minutes, and note weight (z). The percentage x, of Cinnamein in the Balsam is given by the following equation $x = \frac{30\ z}{y-z} \times 40$.—Lehmann & A. Müller (Arch. Pharm. 1912,250,1—5).

Balsamum Tolutanum (*Off.* and '98). *Dose*, 5 to 15 grains. Obtained from the trunk of the *Myroxylon Toluifera* (*N.O. Leguminosæ*). Recently prepared is soft, but becomes brittle in cold weather. Soluble 1 in 1 alcohol 90%. A standard of total aromatic acids, is now adopted. **Syrupus Tolutanus.** (*Off.*). *Dose*, ½ to 1 drachm. This is now made by digesting the balsam and water on the water bath ½ hour. U.S. is Tincture of Tolu (1 in 5 of Alcohol 94·9% vol.) 5 parts, Sugar 82, Magnesium Carbonate 1, Water to 100 *s.a.* **Tinctura** (*Off.* and '98) 1 in 10 alcohol 90%. *Dose*, ½ to 1 drachm.

Examination of 20 samples, three of them adulterated, giving indication for colophony with the Storch-Morawski Test.—Evans' Anal. Notes, 1912, 76; *see also* Southall's Report, 1913,24.

Baptisin. *Dose*, 1 to 5 grains. An extractive from Baptisia tinctoria, in small doses a laxative, in large doses a cathartic. Tincture 1 in 10 of Alcohol 60%. *Dose.*—5 to 30 minims.

Baptisol a phenol in *B. Tinctoria* responsible for the blackening of the leaves on bruising or treating with chemical agents.—P.J. ii./15,761.

Barii Chloridum. — Barium Chloratum, P.G. $BaCl_2 2H_2O = 244{\cdot}322$. *Dose.*—½ to 1½ grains. Max. single 3 grains or 9 grains per diem. Colourless crystalline plates, with bitter saline taste. *Soluble* 1 in 2½ of water. Solution is destructive to bacteria. *Incompatible* with sulphates, phosphates, tartrates and carbonates.

Mostly used for analytical purposes, but is of value as a heart tonic; has alterative properties; has been tried for syphilis and scrofula. Also 1% solution as eye wash in scrofulous inflammation. Varicose veins are treated by internal use, and applied locally over the distended vessels.—H. In the form of **Barium Water** (*vide* Mineral Waters) it has also been much used for glandular swellings. *Antidote.*—Sodium Sulphate.

Barii Nitras. $Ba(NO_3)_2 = 261{\cdot}39$ and **Barium Acetate** $(CH_3COO)_2Ba = 255{\cdot}433$ are employed in place of the chloride for testing.

Bassia Latifolia. Mowra Flowers in India. Contain a very large proportion of fermentable sugar—in one case over 63% of the weight of the air-dried flowers. A potable spirit can be prepared from—the Oil being removed by patented process. A perfectly pure spirit was prepared by digesting the strong distillate with solid Potash and redistilling,—possibly the basis of the process.—P.J. ii./10,120,141.

The seeds yield *Mowrah Butter* melting at 24° to 25° C., this fat is also suitable for candle and soap making (*c.f. B. Longifolia*) also as a food, but it soon becomes rancid in the hot climate.

Bassia Longifolia. N.O. *Sapotaceæ.* The seeds of this tree growing in

Southern India and the Malay States are called Mowrah Seeds. *Syn.* Illipi, Illipei or Illupi Nuts; they yield 43 to 52% of a whitish-yellow or greenish-yellow solid fat M. pt. 42° C. and solidifying at 36° C. This fat contains about 80% of stearin and is therefore specially suitable for candle making. The residue after expressing the oil was found to contain a Glucoside 'Mowrin.' This yields 'Mowric Acid.' The parent substance has laking effects on blood corpuscles when suspended in saline solution. Both Mowrin and the acid have a digitalis-like action on the heart when injected.—B.M.J. ii./09, 541; P.J. ii./09,364, but they have an injurious effect on the heart and hæmolyse blood corpuscles.—B.M.J. i./12,61.

Beberinæ Sulphas. *Syn.*—Buxine and Pelosine. Probably a mixture of Sulphates of Beberine, $C_{36}H_{42}N_2O_6$, and Nectandrine, $C_{40}H_{45}N_2O_8$. *Dose*, 1 to 10 grains; if in a mixture a little Aromatic Sulphuric Acid covers its bitterness. It is in scales, and is prepared from the bark of *Nectandra Rodiœi*, Bebeeru bark. It is also contained in Pareira Root.—Recent Examination Arch. Pharm. *250*, 684. It is freely soluble in water. **Beberine Hydrochloride** is in reddish brown scales. Use, antipyretic and tonic as Quinine; useful for menorrhagia.

Belæ Fructus (BAEL FRUIT). *Off.*—*Ægle marmelos* (*Rutaceœ*). Fresh half ripe fruit. Mild astringent.—P.J. 46; E.P.I. i./120. Fresh fruit useful in dysentery.—L. i./02,66. In dyspepsia.—Ghosh.

Extractum Liquidum, *Off.*—*Dose.*—1 to 2 drachms.

Syrup Ægle Marmelos Co: *Dose.*—Half to 1 ounce with water thrice daily. Is a proprietary in India, containing Bael Root, Cyperus Rotundus, Ginger and Plectranthus Zeylanicus. Stomachic in diarrhœa and dyspepsia.

Berberinæ Carbonas $C_{20}H_{17}NO_4$ $H_2CO_3 + 2H_2O$ (Schmidt) = 433·299 or $+5H_2O$. *Dose.*—2 to 5 grains.

Although contained in Hydrastis and Calumba, is obtained principally from the bark of *Berberis vulgaris* and other species of Barberry. In bitter yellowish crystals. insoluble in water. Its salts, the **Hydrochloride, Phosphate**, and **Sulphate**, are bright yellow in colour, and soluble in water, the hydrochloride about 1 in 400, the phosphate 1 in 12, and the sulphate 1 in 150. *Dose* of each.—2 to 6 grains. Given for indigestion, diarrhœa, malaria, and sickness in pregnancy. Berberis Berries (Baies) are official in FR. CX. as ingredient in Electuaire diascordium.

Berberis *Off.*—*B. aristata* (*Berberidaceœ*). Dried stem. Tonic. Extract is known as 'Rasot' in India. Fully described—P J. ii./04,473. In intermittent fever.—Ghosh. *See also* P.I. 12.

Liquor Conc., I.C. Add., 1900.—*Dose*, ½ to 1 drachm. Alcohol 20%, 1 in 2

Tinctura. *Off.* *Dose.*—½ to 1 drachm. Alcohol 60%, percolate 1 in 10.

Betel. *Off.*—*Piper betle.* (*Piperaceœ*). Dried leaves. The fresh leaves are contained in PAN (Beng.).—Ghosh. Stimulant, narcotic, masticatory.—P.J., 208: E.P.I. vi. pt. i., 254; Pg. I. iii., 183. Externally in sore throats.

Blepharis Capensis.—This South African plant is recommended as a remedy for anthrax. Tincture, 1 in 8 of 90% Alcohol. *Dose.*—15 minims (1 Cc.) every three hours; gradually lessened, as the drug is an active one.—P.J. i./98,140. Recommended in snake bites and insect bites, also for toothache.—P.J.ii./00,63.

Vomiting sickness of Jamaica caused by poison produced by the immature fruit of **Blighia Sapida.**—B.M.J ii./17,109.

Boldoa fragrans (*Peumus Boldus*). *Dose.*—1 to 3 grains in cachet or capsule. The leaves, from Chili and Bolivia, resemble those of Sweet Gale (*Myrica Gale*), but are more aromatic. In dyspepsia, liver affections, rheumatism, and as a diuretic for atony of the bladder. *Boldine*, an alkaloid, has hypnotic and slight local anæsthetic properties. *Boldoglucin* is a glucoside with similar action. *Dose.*—3 grains.—B.P.C. **Tinctura Boldoæ**, 1 in 5 of 90% alcohol. *Dose.*—10 to 20 minims. A useful drug for hepatic diseases, especially painful ones. The inhabitants in South America take half a litre of strong decoction in the day.—B.M.J.E. ii./07,72.

Bonduc Nut.—The Seeds of *Cæsalpinia bonducella* are used in India as a tonic and febrifuge—generally mixed with black pepper for the purpose.—I.C.D. ex. P.J. ii./09,337.

Brucea Sumatrana.—A plant indigenous to China and S. Asia. The seed known as El Kossam is said to be useful in dysentery, diarrhœa, and menorrhagia.—*C.f.* B.M.J. i./13,1403.

P1 **Brucine,** $C_{23}H_{26}N_2O_4 + 4H_2O = 466{\cdot}407$. *Dose.*—$\frac{1}{12}$ to ½ grain. An alkaloid from *Strychnos Nux Vomica* seeds—small white acicular crystals, with bitter taste. Very soluble in Alcohol and Chloroform. Its salts are soluble in water. Like Morphine it gives a red colour with nitric acid (*see*

Water Analysis), which Strychnine should not. It is said to possess only $\frac{1}{12}$ of the physiological power of Strychnine. For epilepsy the P1 Hydrochloride, $C_{23}H_{26}N_2O_4.HCl = 430{\cdot}811$, has been given as liquor, same strength as Liquor Strychninæ, in 10 minim doses increased until ½ a grain is reached. P1 **Brucine Sulphate** $(C_{23}H_{26}N_2O_4)_2.H_2SO_4 = 686{\cdot}762 + Aq.$ White crystals soluble 1 in 80 in water. For Dixon's results of comparison with strychnine, *vide* Strychnine.

Bryonia. *Syn.*—Vitis alba ; White Bryony.

B. dioica is the only species commonly found in this country—hence called English Bryony. This was found to contain several principles among which were an enzyme and an essential oil. The portion of alcoholic extractive soluble in water contained a neutral substance, an amorphous glucosidic bitter substance and an amorphous alkaloidal principle—intensely bitter. The portion insoluble in water yielded (1) phytosterol (2) oleic, palmitic, etc. acids, and (3) a new dihydric Alcohol.—P.J. i./11,626, ii./11,492; C.D. ii./11,697.

Tinctura Bryoniæ. B.P.C.—From bruised fresh roots of *Bryonia alba* or *B. dioica* (*Cucurbitaceæ*) a tincture is prepared corresponding in strength to 1 of dried root to 10 of alcohol (60%). *Dose.*—1 to 10 minims (0·06 to 0·6 Cc.) or more. Useful in pleurisy. Relieves the pain and allays the cough. In large doses it is an active cathartic, used for dropsy. It also checks metorrhagia. The fresh plant applied to the skin will cause vesication.

Buphane Disticha. *B. toxicaria* (*Amaryllidaceæ*). Kaffir.—In-Cwadi. A familiar plant on the South African veldt. Root bulbous, standing half out of the ground. Flower head, fleshy pink in colour, becomes detached, and is blown over the veldt to disseminate the species. The bulb coats employed as a protective after circumcision by the natives.—Oliver, C.D. i./08,140.

Two amorphous bases isolated—one called buphanine resembling hyoscine in action and a weakly basic substance with action of a convulsant poison. A crystalline base $C_{16}H_{17}O_4N$ identical with the narcissine of the common daffodil was also found. The bulk also contains copper.—P.J. i./11,788.

Buteæ Semina. *Off.*—B. *frondosa.* (*Leguminosæ*). Dried kernels freed from testæ. Contains Moodooga Oil. Anthelmintic like Santonin.—P.I. 79, 446 ; E.P.I. i. 550 ; Pg. I. i. 454. Pulvis, *Off.*—*Dose.*—10 to 20 grains.

Cajuputi Oleum.—Distilled from leaves of *Melaleuca Leucadendron* and other species. Sp. Gr. 0·919 to 0·930.

An abnormal sample had Sp. Gr. 0·924 and only 54% distilling below 225° C. (genuine Oil gave 84%). It contained only 14% Cineol against normal 60%—the Oil was evidently a fractionated one.—P.R., 1912,3,248 ; Y.B.P., 1913,70.

Gastric flatulence is at once relieved by Spirit of Cajuput 8 minims, Sal Volatile 25 minims, Spirit of Chloroform 15 minims, Spirit of Peppermint 12 minims—taken in a wineglass of water.—A. P. Luff, B.M.J. i./14,635.

Calendula Officinalis. (*Compositæ*). U.S. Dried florets. *Dose.*—15 grains Tincture U.S. 1 in 5 Alcohol 96%. *Dose.*—5 to 20 minims. Applied to wounds, and is given in amenorrhœa. It has diuretic and stimulant properties.

Calumba. (*Off.*) Dried root, sliced, of *Jateorhiza Calumba* (*Menispermaceæ*). Non-astringent tonic for simple debility and indigestion. Can be given with Salts of Iron. Infusion 1 in 20 (cold water) ; Tincture 1 in 10 Alcohol 60% (U.S. 1 in 5). *Flavoring.*—Glyl Aurantii Amari (double dose), Glyl Lavandulæ, Syrupus Aurantii Amaræ. Was represented in I.C. Add. by *Coscinium fenestratum* (false Calumba Root). Calumba is sometimes termed 'Radix Fraseri.'

Cambogia, U.S., P. Austr. *Dose.*—½ to 2 grains. Fr. Cx. Gomme Gutte. Yellow Gum Resin from *Garcinia Hanburii* (*Guttiferæ*) growing in Siam A powerful purgative. May cause severe griping. Will expel tapeworm. Is rarely now given alone.

Canella Alba. Wild Cinnamon (*Magnoliaceæ*) contains Aromatic Oil. Stomachic.

Cannabis Sativa (*Urticaceæ*), Russian hemp-seed, oil-free (extracted by Benzine) has been used in form of decoction, strength 100 Gm. in 1 litre, heated gently and evaporated (without boiling) to 250 Cc. 35 to 50 Cc. of the resulting liquor are given to children in the food. The dried hemp seed freed from oil contains 1·5% Phosphorus in organic combination as against 1% before the fat is removed. Children are said to greatly improve under the treatment.—B.M.J E .ii./07,27.

Emulsio Seminum Cannabis.—10% in water. Used as a potion against gonorrhœa, two glasses daily Has slight sedative properties.—(Russia) Ph. Notes.

Carbo Animalis ANIMAL CHARCOAL. B.P., 1885, U.S., as also **Carbo Animalis Purificatus**—by means of hydrochloric acid. **Carbo Ligni, U.S. Wood Charcoal.** *Dose.*—60 to 120 grains. Made by burning wood, *e.g.*, willow, to red heat with access of as little air as possible. In cachets or as charcoal biscuits as an absorbent in distension of the stomach, *e.g.*, in dyspepsia. Is antiseptic, and is used externally as a poultice to foul ulcers. COCOA NUT CHARCOAL has been employed by Dewar owing to its remarkable powers of absorbing gases to improve high vacua.

Charcoal as an absorbent might be useful in cholera, typhoid, gastroenteritis.—P.J. ii./12,98. As antidote. *See* Poisons and Antidotes.

Liquor Unoline. *Dose.*—½ ounce. A preparation made from willow charcoal containing potassium and other nitrates. In rheumatism, neuritis and arterio-sclerosis.—L. ii./17,53.

Carbonis Bisulphidum. $CS_2=76{\cdot}125$. A clear liquid with characteristic odour Sp. Gr. 1·268 to 1·269. Very slightly soluble in water, but readily in Alcohol, Ether and Chloroform and the fixed and volatile oils. Dissolves Phosphorus Sulphur and Rubber with avidity. Is poisonous, but has been employed in treatment of phthisis.

Acute poisoning by, respirations very slow (about 12 per minute). Expiration deep, prolonged and blowing; heart not much affected, but pulse weak. —Amer. Med., May 27/05; M.A., 1906,12.

In tuberculosis, inhaled, useful, has no disagreeable after effects. Is parasiticide. In fibrinous pneumonia small doses with water have been used.

Carbonis Tetrachloridum..—$CCl_4=153{\cdot}845$. A heavy, volatile, and mobile chloroform-like liqud, has a pleasant pungent, quince-like odour if pure. Sp. Gr. 1·56. B.pt. 77 to 78° C. The vapour inhaled relieves hay fever. Employed locally, sprinkled on piline or lint covered with American oiled cloth. it quickly relieves neuralgic pains. Has been used as, but is not a successful anæsthetic (proportion of deaths stated to be 1 in 20,000.—B.M.J. ii./09,243). Deaths have been caused by its use as a dry shampoo by hairdressers.—Details in Edn. XVI., p. 810.

Cardamomi Semina. Dried ripe seeds of *Elettaria Cardamomum* (*Scitaminaceæ*). The seeds should be removed from their pericarps when required for use. Given in atonic dyspepsia. Contained in **Pulvis Aromaticus,** U.S. **Tinctura Cardamomi Composita** (*Off.*). *Dose,* ½ to 1 drachm. Cardamom Seeds 1·4% with flavourings. Raisins now omitted and 45% Alcohol *vice* 60%. Tincture, U.S., 3 in 20 Alcohol (48·9% vol.). **Compound Tincture,** U.S., Cardamom 20, Saigon Cinnamon 25, Caraway 12, Cochineal 5, Alcohol (48·9% vol.) to 1,000. Compound Cardamom Tincture is incompatible with Akaloidal salts Bismuth Oxide, Oxycarbonate and Subnitrate: employ Liquor Bismuthi in preference. It is also incompatible with metals of the alkaline earths and with Sodium Bromide.—P.J.i./06,218.

Carminum.—Red colouring matter, containing about 50% Carminic Acid, $C_{17}H_{18}O_{10}=382{\cdot}229$, prepared from the cochineal insect—*Coccus Cacti* (*Hemiptera*), the dried fecundated female insect reared on *Nopalea Coccinellifera* and other species of *Nopalea.* The sun-dried insects, if killed by sulphur or charcoal fumes, are silvery colour and designated "silver grain," owing to deposit of wax on the surface. If killed by hot water and dried artificially the "black grains" are produced. It is insoluble in water, but entirely soluble in aqueous ammonia. Is used to colour toilet preparations and for staining in microscopy.

Nature and Structure of Cochineal. An exhaustive paper.—Am. Jl. Ph. Aug., 1913.

Carmalum. Carminic Acid 1, Ammonia Alum 10, Distilled Water 200. Heat to dissolve. Cool and filter. Suitable for staining after osmic acid. c.f. Mayer's Carmalum. **Liquor Carmini.** Carmin 1, Distilled Water *q.s.* to moisten, Strong Solution of Ammonia 1, dissolve, and add Water 10. Used to colour toilet preparations, &c. **Tinctura Cocci** (*Off.* and '98). 1 in 10 Alcohol (45%). *Dose.*—5 to 15 minims.

Liquor Cocci. Liquid Cochineal. Cochineal (not bruised), Potassium Carbonate, of each 1, Distilled Water 8. Heat in water-bath for half an hour, gradually add Acid Potassium Tartrate 1, stir well, continue the heat, and add Potash Alum (in powder) 1; heat five minutes more, strain through absorbent wool, and pour over contents of strainer sufficient Distilled Water to make strained product measure 8; when cold add Chloroform ⅕% by volume. As indicator in titrations the official tincture may be used. Suitable for titrating alkaloids with mineral acids, the alkaloids giving the same colour as mineral alkali.—P.J. ii./08,194. Ipecacuanha Alkaloids give trouble however.—Am. Jl. Ph., Nov., 1911, p. 158.

Carui Oleum. *Syn.* OLEUM CARI, U.S.—Caraway Oil. *Dose.*—½ to 3 minims. Distilled from fruits of Carum Carvi (*Umbelliferæ*) (content up to 7%), and rectified. Colourless or yellowish oil. Sp. Gr. 0·910 to 0·920. Soluble in equal vol. of 90% Alcohol.—*Off.* U.S. has Sp. Gr. 0·900 to 0·910 at 25° C. O.R. +70° to +80°.

Carvonum, P. Austr. *Syn.* Carvol. $C_{10}H_{14}O = 150·162$.

A yellowish or colourless liquid prepared from the oil has Sp. Gr. 0·960—0·964. Soluble 1 in 2 diluted alcohol.

See also Allen, 1911, vol. iv., p. 214, for method of determination, &c.

Caryophylli Oleum.—Clove Oil. *Dose.*—½ to 3 minims. Colourless to brownish oil. Distilled from the flower buds of *Eugenia Caryophyllata* (*Myrtaceæ*). Sp. Gr. 1·047 to 0·165. *Off.* Soluble 1 in 3 of 70% Alcohol. We find by experiment samples agree with this. Should contain at least 85% Eugenol (*Off.* and Ph. Ital.). U.S. specifies 82%, *v.* p. 796. Aromatic carminative. Given with advantage both internally 3 to 5 minims ,and injected hypodermically in phthisis 5 minims in olive oil. A most satisfactory disinfectant for the hands (said to be even more efficient than Mercuric chloride), catheters, catgut, &c.—P.J. ii./06,553.

Castor Oil as an adulterant to the extent of 10% found in Clove Oil. The Oil was dextrorotatory. Treated with steam the residue was easily detected. Sap. V. 179, soluble in 90% Alcohol, insoluble in Petroleum Ether.—Schimmel's Report, Oct., 1912, p. 48.

Tinctura Caryophylli 1 in 8 Alcohol 90%. Digest 10 days. *Dose.*—20 to 40 minims or more; valuable aromatic, carminative and stimulant.

In senile flatulence good effects by powdered cloves, better even than a fluid preparation. Spirit of cloves is absorbed in the stomach, but the woody fibre passes on to the seat of the complaint. 5-grain capsules of powdered cloves coated in keratin (keratin coating not satisfactory.—W.H.M.), recommended for trial.—L. ii./10,1306

Cascarilla, (*Off.*). Dried bark of *Croton Eluteria* (*Euphorbiaceæ*). Contains resin and 0·5 to 3% Volatile Oil, also the bitter principle cascarillin (best extracted by Acetone—Naylor, P.J., July 28,06), together with resin and tannin. Aromatic tonic. **Infusum Cascarillæ,** 1 in boiling distilled water, 20. Infuse 15 minutes. **Tincture** (*Off.* and '98), 1 in 5 Alcohol 70%. *Dose.*—½ to 1 drachm.

Casimiroa edulis (*N. O. Rutaceæ*). This Mexican plant has hypnotic and analgesic properties. Liquid Extract in doses of 1 to 2 dr. has been given producing sleep in 2 to 3 hours.—L. ii./09,561.

Cassia Beareana. A native Ceylon remedy for fever, blackwater fever, and malaria.—L. i./02,282; i./03,190,796. A liquid extract, 1 in 1 is prepared. *Dose.*—30 to 60 minims, well diluted with water. A Decoction may be prepared by boiling 6 to 12 pieces, about 1 inch in length, of the root for ½ hour in a gallon of water. Patient takes a drink of the red liquid hot or cold occasionally.—P.J. ii./12,672.

Cassiæ Pulpa, *Off.* *Dose.*—1 drachm to 2 ounces, from pods of *Cassia Fistula* Linné (*Leguminosæ*), **Cassia Fistula,** U.S. *Av. dose.*—1 drachm. Dried cylindrical brown fruit 20 mm. in diam., and 25 to 50 cm. long. Fr. Casse en batues. Mild aperient.

Castor, P. Austr. and Helv. Dried preputial follicles and secretions from the Beaver. *Castor Fiber* (*Rodentia*), in brown pieces. To contain not more than 40% insoluble in hot alcohol. Stimulant and antispasmodic. Is given in dysmenorrhœa as tincture 1 in 20. *Dose.*—½ to 1 drachm, suspended in water, with Mucilage of Acacia, or the tincture may be evaporated and equivalent of these doses given in *capsule* form. *See* also Mistura Morphinæ et Phenazoni Composita.

FR. CX. describes the two commercial varieties Canadian and Russian

Guttæ Castorei Compositæ containing Tincture of Castor 1 ounce, Compound Chloroform Tincture 4 drachms, Compound Tincture of Lavender 1 ounce, Spirit of Camphor 4 drachms, Spirit of Nitrous Ether 1 ounce. A teaspoonful in water for nervousness or sleeplessness.—B.M.J. i./09,691. There is some mistake as to the quantity of guttæ in the reference—but as written by us the dose is safe.

Catechu (*Off.*). *Syn.* Catechu Pallidum. Dried extract of leaves and young shoots of *Uncaria Gambier* (*Rubiaceæ*). Gambir, U.S., is the dried extract from *Ouroupraia Gambir* (*Rubiaceæ*). Soluble in water to the extent of about 50% (U.S. 65%). Astringent in diarrhœa. *Dose.*—5 to 15 grains. **Tincture** 1 in 5, Alcohol 45% with Cinnamon 1 in 20. (Tinctura Gambir Composita, U.S.—*Average dose,* 1 drachm ; 1 in 20 Diluted Alcohol with Saigon Cinnamon 1 in 40). **Trochiscus Catechu,** contains 1 grain. For relaxed throat.

Catechu Nigrum, *Off.* *Dose.*—5 to 15 minims from Acacia Catechu. May be used in other parts of the Empire

Caulophyllin. *Dose.*—1 to 4 grains. Resinoid from root of *Caulophyllum thalictroides*—blue cohosh, pappoose, or squaw root. Contains an alkaloid, which is chemically Methylcytisine, $C_{12}H_{16}ON_2$, M.Pt. 137° C. (Cytisine occurs in Laburnum seeds and in the common gorse.) It also contains two glucosides, which are saponins.—F. B. Power and A. H. Salway, C.D. i./13,202. Has diuretic, diaphoretic, anthelmintic properties, emmenagogue, and antispasmodic. It appears to exert a direct influence on the uterus, Liquid Extract made with Alcohol 70% N.F. 1 = 1. *Dose.*—8 minims. Examination of the fruit of.—P.J. ii./08,550.

Liquor Caulophylli et Pulsatillæ B.P.C. *Dose.*—1 to 2 drachms Liquid Extract of Caulophyllum 25, Liquid Extract of Pulsatilla (1 = 1 with 60% Alcohol) 5, Glycerin 15, Alcohol 60% to 100.—P.J. ii./10,393.

A sedative in dysmenorrhœa and uterine disorders.

Cedri Ligni Oleum chiefly from *Juniperus Virginiana* (*Coniferæ* ; family *Cupressineæ*) yields a stearoptene Cedrene Camphor [$C_{15}H_{26}O = 222{\cdot}283$] and an oleoptene Cedrene $C_{15}H_{24} = 204{\cdot}267$, the odour of which is distinct and stronger than the Camphor, and taste finally peppery. Oil largely used in perfumery, also, in a thickened form by concentration in vacuo, in microscopical work with oil immersion lenses. **Paraffinum Liquidum,** is also used for this. It is excellent for the purpose.—Rowntree, Jl. Path. & Bact., 1908.

It is also the product of distillation of chip shavings and sawdust of pencil cedar (*J. americana* and *J. bermudiana*). It resinifies rapidly and is suggested as an addition to Paraffin for burns.—M. Hartog, L. i./17,475.

Cedrus Atlantica. The essential oil distilled from the wood. *Syn.* **Libanol.** Sp. Gr. 0·9517. $\alpha D = +48°$ at 20° C. Soluble 1 in 3 to 4 of Alcohol 90%. 200 cases of blenorrhœa well treated with the oil instead of with Santal Wood Oil. Results equal in all respects to those obtained by other balsamic preparations.—F.N. 1909. Capsules contain 8 minims. *Dose.*—Up to 6 per diem *p.c.* Said to be useful in phthisis, bronchitis and skin affections. **Ointment** 25% with Vaselin basis.—N.S.D.

Cera Alba is Yellow Wax (*Cera Flava*) bleached from the honeycomb of *Apis Mellifica* (*Hymenoptera*), M.pt. about 61—64° C. To detect paraffin char with Sulphuric Acid, which completely oxides the wax—leaving the paraffin unchanged—this may then be extracted with ether. Paraffin lowers the M.pt. A solution in carbon tetrachloride suggested to spray the hands to form a coating for surgeons' use prior to operation.—L. ii./07,934.

White Wax has almost invariably the higher Acid value.—Southall's Lab. Rep., 1912 (P.G.V. gives yellow 18·7 to 24·3 and white 18·7 to 22·4).

Cera Aseptica. Horsley's Wax. An aseptic wax for surgeons' use.—Yellow Wax 7, Carbolic Acid 1, Olive Oil 2.

A pure sample of English Yellow Wax had the abnormally low Acid value of 15·9. Adulterants found in various samples were Ceresin, Stearin (in one and the same sample), Resin and Tallow.—Evans' Anal. Notes, 1911.

Oxycroceum Plaster. P. Helv. Yellow Wax 35, Colophony 25, Elemi 10, Galbanum 5, Myrrh 5, Resin 12, Crocus 1, Extract Rhatany 2. Modified formulæ are given in P. Edin. and P. Lond.

Cereus (Cactus) Grandiflorus (*Night-blooming Cereus*).—Used in asthenic conditions of heart and dropsy.—B.M.J. i./90,70. Liquid Extract (imported), 1 = 1. *Dose.*—1 to 10 minims. Tincture, fresh flowers and young stems 1, alcohol 4. *Dose.*—2 to 10, increased to 30 minims. Has been lauded in the past as a cardiac tonic, free from cumulative or narcotic action. Valuable in functional disorders, palpitation in dyspepsia and Graves' disease and the milder forms of angina, but evidence is doubtful, *e.g.*, Cactin or Cactina stated to be quite inactive even in doses 100 or 1,000 times those directed.—P.J. ii./08,164 ; P.J. ii./13,809.

Cerii Oxalas. U.S., Ph. Ned., Jap., $Ce_2(C_2O_4)_3$, $9H_2O = 706{\cdot}674$. *Syn.* CER OXYDULOXALAT (German). $10H_2O$ is considered more correct than 9. *Average dose.*—3 grains (U.S.) A white crystalline powder insoluble

in water. When incinerated it loses 53% of its weight. *Uses.*—Is given in vomiting, particularly that of pregnancy, also in chronic diarrhœa, hysteria epilepsy and migraine.

In sea sickness and more especially in vomiting due to utero-gestation Cerium Oxalate in doses of 2 to 3 grains mixed with powdered sugar given every 2 or 3 hours has proved of use.

Cerii Sulphocarbolas. *Syn.* CERII PHENOL-SULPHONAS. *Dose.*—1 to 5 grains (0·06 to 0·3 Gm.) $Ce_2[C_6H_4(OH)SO_3]_6 = 1319{\cdot}28$ (+Aq.).

A well-defined crystalline salt resembling the corresponding thorium body in appearance, suggested for therapeutic use by G. T. Morgan (*vide* p. 742) Further chemical data on Cerium Compounds, *vide* Vol. II.

Cestrum Parqui.—A S. American shrub termed by the natives of Chili simply 'Parqui.' Sudorific and antipyretic. Contains alkaloid Parquine with bitter taste very like Strychnine. Provisional formula $C_{21}H_{39}NO_8$. A nerve and muscle poison unlike Strychnine, it diminishes the sensibility and conductibility of the nerves and acts on the sensitive extremities after the manner of Atropine, thus producing local analgesia.—Bull. Sci. Pharmacol. Oct. 1913,584, per P.J. ii./13,729.

Cetaceum, Spermaceti *Syn.* **Blanc de Baleine** FR. CX. White unctuous crystalline substance (M.pt. 46—50° C.), obtained from *Physeter Macrocephalus* and other species of whale, *e.g.*, *Hyperoodion rostratus.*—P.J. ii./13,68. The spermaceti from the latter is somewhat harder and quite equal in quality. Consists chiefly of Cetyl Palmitate, $C_{15}H_{31}CO.OC_{16}H_{33} = 480{\cdot}672$. Soluble in chloroform 1 in 1½ and in Ether about 1 in 7, also in hot alcohol. Is contained in Cold Cream *q.v.* Unguentum Cetacei (*Off.*). Now contains Liquid Paraffin in place of Benzoin and Almond Oil. Cetaceum injected warm (40° C.) the night before the operation on thin-walled cysts, after tapping and washing out with warm water.—B.M.J. i./06,154. More suitable as an addition to theobroma suppository mass than wax, which should not be used beyond 10% addition.—C.D. ii./04,498.

Æthol or **Æthal.**—Cetyl-Alcohol, $C_{16}H_{33}OH = 242{\cdot}352$, in crystals from Spermaceti. For dermatological use, rubbed on the skin, becomes unctuous; is mixed with boric acid, under the name of *Borsyl.*

Cetraria Islandica (*Discomycetes* or *Discolichenes*), **Iceland Moss** was at one time used as a "throat remedy," in form of decoction, jelly, or lozenge, and was Official in the British Pharmacopœia 1885. The moss contains Cetrarin 3% Lichenin, $C_{12}H_{20}O_{10} = 324{\cdot}22$ 45%, Amylaceous Fibrin 36%, Gum 4%, Non-crystallisable Sugar 4%, Water and Salts (inorganic) 8%. Lichenin is a starch-like body which has been shown to consist of two elements soluble in hot water,—one of which is also soluble in cold water. The bitter tonic principle Cetrarin $C_{18}H_{16}O_8$ (Schmidt) = 360·218 is extracted by hot water and gives the characteristic taste to the decoction. *Dose*, 2 to 4 grains. A white micro-crystalline powder, soluble in alcohol, slightly so in water and ether. A bitter tonic and laxative in constipation of chlorosis and anæmia. **Lichenoids** composed of Iceland Moss lubricate and soothe the mucous membrane of the throat. To be slowly dissolved in the mouth, suitable in inflammatory and excitable states of fauces and oropharynx, especially to speakers who suffer with dry mouth and throat. As a sialogogue they are excellent correctives in pyrosis.—B.M.J. i./06,629.

Chaparro Amargosa. Bitter Bush. *Syn.* **Castela Nicholsoni.**—a wild plant of South Texas and Mexico. Decoction a heaped teaspoon of twigs and leaves or root bark or decorticated root in 20 ozs. of water, boiled for 15 to 30 minutes. Enema also used as above. The drink as above taken thrice daily. *E. Histolytica* carriers treated. Results not very convincing.—S. Shepheard and D. G. Lillie, L. i./18,501.

Cheiranthus Cheiri (*Cruciferœ*, Wallflower).—This plant is stated to contain a Digitalis-like glucoside of such power that 0·0005 Gm. will produce systolic cardiac arrest in the frog—also an alkaloid cheirinin which acts on nerve centres and on muscles.—U.S.D. The Oil of the flower is prepared by extraction with a highly volatile solvent, and treatment of the fatty residue with alcohol, then steam-distilling the residue, yield about 0·06 per cent. of the weight of the flowers. Is of slight blue colour with fluorescence, Sp. Gr. 1·001, acid value 0·35, Ester value 20, S.V 20—35.

Chekan—The leaves of *Myrtus Chekan* are aromatic and expectorant; used in chronic coughs and bronchitis. *Dose*, of fluid extract, ½ to 3 drachms.

Chelidonium Majus.—GREATER CELANDINE.—The yellow milky juice is an old remedy for warts and opacities of the cornea. The freshly expressed juice preserved by ½% by volume of chloroform has been much used as a remedy for cancer, given internally in dose of 10 to 60 minims, and in some cases with striking results. A fluid extract (*Dose.*—10 to 30 minims) from the dried plant has been used for injection into diseased tissue, and, diluted, as a lotion. An alkaloid, Chelidonine. $C_{20}H_{19}NO_5,H_2O = 371{\cdot}278$, has been isolated, melting at 135° C. forming a Hydrochloride, $C_{20}H_{19}NO_5HCl = 389{\cdot}73$ and a Sulphate $(C_{20}H_{19}NO_5)_2H_2SO_4 = 804{\cdot}60$ in minute yellowish granular crystals; have been used as morphine substitutes in cancer. *Dose,* 3 grains twice a day.—P.J. ii./01,317,361.

Chenopodium Anthelminticum. Linne (*Chenopodiaceæ*). Contains a Volatile Oil, Official in U.S. *Average Dose,* 3 minims. For round worms-10 minims on sugar or in emulsion has also been tried with good results in ascarides, giving 0·25 to 0·5 gram in sugar and water, and following this in an hour or two with a dose of castor oil. The treatment may be repeated after a day's interval. The fresh plant contains chenopodine an alkaloid. Liquid Extract 1 = 1. *Dose.*—½ to 1 drachm.

Experiments showed that 1 in 10,000 of the Oil kills living ascaridæ, while Eucalyptol does not kill in several days in 1 in 2,000 Solution.—H. Brüning, Schim. Rept., Oct., 1912.

For ankylostomiasis best taken in conjunction with Thymol at suitable interval. *Dose* 16 minims in two capsules followed by 2 ounces of Castor Oli in 4 hours. Thymol in doses of 5 grains.—Recent report on public health of Jamaica, C.D. January 13/17.

Hookworm well treated by two eight minim capsules followed in 4 hours by 2 ozs. of Castor Oil. Repeat. Superior to Thymol.—Bishop & Wilson. Jl. Am. Med. Assn., LXV., 19.

Chirata.—*Swertia Chirata* (*Gentianaceæ*). Entire plant. Bitter tonic given in indigestion for anorexia and torpid liver with constipation. *Dose* of powder 20 grains. Fluidextract, U.S. VIII. *Average dose.*—15 minims. Tincture (*Off.*) 1 in 10 Alcohol 60%. *Dose.*—½ to 1 drachm. Might be made with Alcohol 45%—P.J. ii./09,142. Infusion (*Off.*) 1 in 20. *Dose.*—½ to 1 ounce.

Japanese Chiretta. Swertia Chinensis is more bitter than the official.—V. Cofman B.P. Con, 1919.

Chlorophyll.—The green colouring matter of plants extracted by firstly either, then alcohol—in which latter the chlorophyll is soluble, leaving the waxy matter behind. Supplied commercially in solid extract and liquid form

Chondrus Crispus (*Gigartinaceæ*), U.S. Irish Moss. **Carrageen, Ph. Ned., P. Belg.** Employed as decoctce, Moss ½ ounce Water 1½ pints boiled down to 1 pint. Flavoured with a little sugar and lemon juice. Demulcent and nutritive. Contains about 60% Carbohydrate, 7% Protein, and 10% more or less of ash.

Cicuta Virosa (*Umbelliferæ*), Water Hemlock, Cowbane, or Wild Parsley. contains Cicutoxin, a substance giving rise to convulsions by action on the spinal medulla. Poisonous to some animals, though eaten by sheep without killing them.

Water hemlock poisoning—cases of.—G. A. Stutterheim, Pharm. Weekblad, 1918, abst. Y.B.P. 1919, 179.

Cimicifugæ Rhizoma (B.P. 1898), U.S. *Dose.*—15 grains. The rhizome and rootlets of *Cimicifuga racemosa*, *Actœa racemosa* (Linn.), black snakeroot or black cohosh. Indigenous to the United States and Canada. Conta [illegible] resinoid Cimicifugin, also a small quantity of Isoferulic (hesperetic) Acid and a trace of an alkaloidal body.—P.J. ii./09,154; ii./10,142. *Dose.*—1 to 6 grains in pill. Useful in chronic rheumatism where one part of a tendon, muscle, or articulation is painful, or where the disease is traceable to previous affection; also in lumbago, sciatica, pleurodynia, chorea, and amenorrhœa; also as a tonic and antispasmodic, and to excite contraction of the uterus. **Liquid Extract** (B.P. 1898). 1 = 1 of Cimicifuga exhausted with 90% alcohol. *Dose.*—5 to 30 minims. **Fluidextract U.S.** 1 = 1 *Average Dose.*—15 minims. U.S. IX. has also (powdered) extract (*Dose* 4 grains), made by extracting the drug with alcohol 94·9% by vol. and diluting with dry starch, so that 1 of extract = 4 of drug. **Tincture.** (B.P. 1898). *Syn* TINCTURA ACTÆÆ. 1 in 10 of 60% alcohol. U.S. 1 in 5 alcohol (94·9% vol.). *Dose.*—30 to 60 minims or 5 minims every hour. *Flavoring* Syl Vanillæ, Syl Rosæ; Syrupus Aromaticus.

In rheumatoid arthritis Sydney Ringer recommended a mixture containing 15 minims of tincture with 5 minims of tincture of gelsemium three times a day.—Pr., Nov., 1910.

Snake Root, in India, is termed *bo boni*, has the appearance of dried ginger, and is white in section. It is eaten in pieces size of a pea after poisoning. The snake charmers use it to stupefy snakes. (This Indian snake root has evidently no connection with Cimicifuga.) 'Snake stone' is said to be obtained from a frog,—it is also used in India after poisoning.—It is stated to "cure."—For details see L. i./11,892,1535.

In chorea Liquid Extract of Cimicifuga from fresh herb in $\frac{1}{2}$ to 3 m. doses for a child 12 years. Liquid Extract of Gelsemium, 1/3 to 1 minim may be given in conjunction, as also Liquid Extract of Scutellaria laterifolia—a reliable sedative. 2 minims for a dose for a child. Should insomnia be present give Hyoscyamus (not mixed with the above)—3 to 4 minims of Tincture in water every half hour, beginning late afternoon until sleep occurs. —Pres., July, 1913, 244.

Cinchonidinæ Salicylas $C_{19}H_{22}N_2O,C_6H_4OH$. $COOH=432·374$. Is useful as a tonic and antiperiodic in neuralgia, rheumatism, sciatica, &c., 5 grains every 2 hours in pills or cachets.

Cinchonidinæ Sulphas.—$(C_{19}H_{22}N_2O)_2H_2SO_4$, $3H_2O = 740·706$. (From alcohol crystallises with $2H_2O$.). *Dose.*—1 to 10 grains. In silky white needles from mother liquor of Quinine Sulphate. *Soluble* 1 in 60 of Alcohol, 1 in 100 of water (more so with a little acid). In intermittent fevers, malaria, and neuralgia.

Cinchonina. $C_{19}H_{22}N_2O = 294·291$. *Dose.*—1 to 10 grains. Cinchonine salts are the cheapest of the alkaloidal salts of Cinchona. Their nauseous bitter taste is objectionable, though as prophylactics some have thought them superior to quinine.

Cinchoninæ Hydrochloridum. $C_{19}H_{22}N_2O.HCl,2H_2O = 366·791$. *Dose.*—$1\frac{1}{4}$ to 10 grains or more. In white acicular crystals, soluble 1 in 30 water and 1 in 2 of alcohol 85%. (Commercial samples we find vary.)

Cinchonine Acid Hydrochloride. $C_{19}H_{22}N_2O.2HCl = 367·227$. Solution 1 in 2 by intramuscular injection—dose $7\frac{1}{2}$, 10 or 15 grains or the Acid Hydrobromide in malaria equal to or better than quinine.—Sir L. Rogers, B.M.J. ii./18,459.

Cinchoninæ Sulphas, U.S. $(C_{19}H_{22}N_2O)_2H_2SO_42H_2O = 722·69$. *Dose.*—$1\frac{1}{4}$ to 10 grains or more. In hard, colourless, short rhombic prisms with a vitreous lustre. Soluble 1 in 70 cold water, 1 in 10 alcohol 90%. Dilute solution in Dilute Sulphuric Acid should not be markedly fluorescent (absence of Quinine and Quinidine). The **Sulphocarbolate.** $C_{19}H_{22}.N_2O.C_6H_4.SO_3$ H.OH (?)$=468·429$. In reddish white needles. Antiseptic febrifuge.

Cocillana (*Guarea Rusbyi*). The bark of a South American plant, stated to equal ipecacuanha in expectorant properties and to be, in addition, tonic and laxative. Syrup of Cocillana Compound a specialty. Each drachm containing Tincture of Cocillana 5 minims. Tincture of Euphorbia Pilulifera 15 minims, Syrup of Wild Lettuce 15 minims, Compound Syrup of Squill U.S. 3 minims, Cascarin 1 grain, Heroin Hydrochloride $\frac{1}{24}$ grain, Menthol $\frac{1}{100}$ grain. *Dose.*—$\frac{1}{2}$ to 1 drachm.

Cochlearia Armoracia, fresh Horseradish Root. Sialogogue, stomachic, and slightly diaphoretic. Yields pungent volatile oil on moistening or rasping. Used as **Spiritus Armoraciæ Compositus** (*Off.*).

Collinsonia Canadensis.—The root of this, commonly known as stone-root or knob-root, Heal-all, Hardhack, in America, has been employed in gravel and other urinary affections. Is an antispasmodic in flatulent, infantile, and biliary colic, and locally in lax conditions of the uvula, pharynx, and vocal cords. Tincture, 1 in 10 of alcohol 60%. *Dose.*—$\frac{1}{2}$ to 2 drachms. Liquid Extract, 1 in 1. *Dose.*—15 to 30 minims. Suppositories containing 20 to 30 grains of the powder are also used. Has also been employed in cancer of stomach and cystitis. The early colonists in America probably used the fresh root for 'the liver.' The tincture is said to be really useful—something of the Podophyllum effect without griping.—C.D., April 13, 1907. Under the name **Helalin**, Liquid Extracts are prepared containing, in addition, Cascara, and Pepsin as hepatic stimulants. *Dose* of each 1 drachm.

Condurango Cortex, P.G.V.—*Dose*, in powder, 15 to 60 grains (1 to 4 Gm.). The stem bark probably of *Marsdenia cundurango, Reichenbach fil.* from Peru. Is bitter and acrid. ***Uses***.—Alterative, a supposed specific for cancer, syphilis, and dyspepsia, and with hydrochloric acid in enuresis, is a stomachic and stimulant. **Extractum Liquidum**, B.P.C., 1901. 1 = 1 of Bark in 60 powder exhausted with 60% alcohol. *Dose.*—10 to 60 minims. Alcohol 45% is a good menstruum.—P.J. i./01,747. **Infusum**, 1 in 20 of hot water. *Dose.*—

½ to 2 ounces (15 to 60 Cc.). **Vinum, P.G.V.** 1 in 10 Sherry. Macerate 8 days. Fluidextract of Condurango 1, Malaga 9 (P. Austr.). *Dose.*—½ to 1 ounce (15 to 30 Cc.). **Tincture** 1 in 10 Alcohol 60%. *Dose* as last.

Convallaria Majalis (*Liliaceæ*). LILY OF THE VALLEY.—(Entire plant). Two glucosides have been obtained from the plant; **Convallarin** $C_{34}H_{62}O_{11}$. (Walz) = 646·666, a purgative without cardiac action. *Dose.*—3 to 4 grains; and **Convallamarin** $C_{23}H_{44}O_{12}$ (Walz) = 512·350. *Dose.*—½ to 2 grains. Convallamarin is a cardiac stimulant and diuretic and has been used in preventing arrest of circulation in chloroform narcosis.

Its action is so feeble as to be almost of no action in medicine.—G. Sharp P.J. i./16,347.

The juice of the plant was found to contain 0·45 % Convallamarin and 0·12% Convallarin.—P.J. ii./04,967. **Tincture**, B.P.C *Dose.*—5 to 20 minims, 1 of flowers in 8 of Alcohol 60%. The drug is an old remedy for dropsy, and used in organic heart and renal affections. *c.f.* Action of Digitalis. Aqueous **Extract.** *Dose.* — 2 to 8 grains, in pill. **Fluid-Extract** U.S. *Average dose*, 8 minims. 1=1 of dried rhizome and roots. Flowers preferred to roots, as latter contain little glucoside.—P.J. ii./99,622.

In mitral stenosis a remedy with some advantages—it does not produce nausea. It is well to commence with small doses, *e.g*, 10 minims of Tincture. —Pr., August, '12,212.

Glyco-Gelatin Pastils contain 2 minims of tincture. These dissolve slowly and are hence very useful for prolonged cardiac action.

Coorchi or Kurchi (from Assam) is antidysenteric. A Liquid Extract 1=1 and Tincture 1 in 10 have been made.

Coptis Teeta (*Ranunculaceæ*).—This plant grows in Assam. It is stated to contain as much as 8% Berberine. It is used for its tonic properties. Fluid xtract in dose of 0·3 to 3 Cc. *pro die* in malarial and other fevers.—Ph. Notes Italy.)

The rhizome under the name **Mamiran** is used in Sind for inflammation of the eyes. There are several species. A complete account of same has been published. *Vide* P.J. ii./09.671. See also D. Hooper, P.J. i./12,482.

Corchorus Capsularis. Round podded jute. An infusion of the leaves is a popular remedy in Bengal. Contains a glucoside. A valuable gastric tonic in atonic dyspepsia.—Int. Drugs Com. Rep., 1916. To extract the bitter principle (the seed contains a larger quantity of it) dry at 105° C. before powdering. Mix with sand and exhaust with petrol to remove fat, then extract with Alcohol—the body is also soluble in water. It is difficult to get to crystallise.—R. S. Finlow, Fibre Expert, Govt. of Bengal, Dacca.

Coriandri Fructus. *Dose.*—20 to 60 grains. Dried ripe fruit, *Coriandrum sativum* (*Umbelliferæ*). Aromatic and carminative. **Oleum Coriandri** (*Off.*) *Dose.*—½ to 3 minims, Sp. Gr. 0·87 to 0·885. A sample we examined 1914 had Sp. Gr. 0·888. Is contained in preparations of rhubarb and senna to prevent griping.

Aqua Carminativa P. Austr.—Peppermint Leaves, Roman Chamomile Flowers, Fennel Fruit, Coriander Fruit, Caraway, Orange Peel, of each 15 Distil *secundum artem* to produce 1 000. A pleasantly flavoured aromatic water.

Coronilla varia.—An aqueous extract of the leaves and flowering tops is used as a remedy in many cardiac affections. It possesses the great advantage over digitalis and strophanthus that it does not derange the digestive functions. *Dose of extract* is 1½ grains (0·1 Gm.) three or four times daily.—P.J. ii./98,661. The active principle Coronilline lessens frequency of the pulse, kills by cardiac paralysis.—B.M.J.E. ii./98,55. Tincture 1 in 8, by percolation. *Dose.*—30 to 60 minims.

Costus. The root of this tree of which the Kashmir Government have the monopoly, contains a small amount of Essential Oil (we obtained 0·015%) In the powdered condition it has been much used for preserving shawls, furs, etc., from moth. The oil is of peculiar odor and has been much used as a basis for perfumes: the powder for sachets.

Crocus, Saffron (B P., 1898). The dried stigmas and tops of the styles of *Crocus sativus* (*Iridaceæ*) Linn. Every filament should give a blue colour on placing in Sulphuric Acid.—Mann. It is a curious old delusion that saffron tends to bring out the rash of measles.

Cucumis (*Sativus*).—**Cucumber.**—The juice of the fruit is in French Codex to prepare **Unguentum Cucumeris**—*Syn.*—Fr. POMMADE AUX CONCOMBRES

Cucumber Juice 1,200, Lard 1,000, Veal Suet 600, Balsam of Tolu in Alcohol 90%. *q.s.*, 2, Rose Water 10. Is a cooling ointment, used like cold cream.

Cucurbitæ Semina Præparatæ. MELON PUMPKIN SEEDS. *Off.—Dose.*—3 to 4 oz. bruised with water or milk. Fresh ripe seeds of *C. maxima.* (*Cucurbitaceæ*), deprived of testa and tegmen. Anthelmintic.—Give first a saline purge and afterwards Castor Oil. The oil of the seeds ½ ounce, repeated at 2 hours also efficient.—Ghosh

Ⓟ**Curara.** *Syn.* CURARE, OURARI, URARI, WOURARA, WOURALI. *Dose*—$\frac{1}{20}$ to ½ grain. The South American Indian arrow-poison, produced from species of *Strychnos* and other plants (*Loganiaceæ*). A blackish-brown dry extract, with bitter taste; contains some resin, but is nearly all soluble in water.

Two varieties of Curare are said to be made, one from the fresh bark of the branches of *S. Gubleri*, strong (for larger animals) and the other (weak, for small birds, &c.), from *S. toxifera.*—P.J. ii./06,381.

Curare is an extract of different plants of which the active principle is derived from the bark of various kinds of a Liana-like South Americian *Strychnos.* Commercial "Calabash" Curare is derived from *S. Toxifera*: "Pot" Curare from *S. Castelnaei* together with *Cocculus Toxiferus* (*Menispermaceæ*), while "Tubed" Curare is from unknown plants.—B.M.J. ii./11,218.

Antidotes.—(There is no tetanus—poisoning is not like that of Strychnine.) Artificial Respiration, Stimulants—brandy, hot gin, sal volatile freely. Ligature if wound; this may be cautiously loosened and tightened again to admit a little of the poison at a time to the system. Wash the wound.—Murrell.

This and Curarine have been given hypodermically and in hydrophobia for strychnine poisoning. For tetanus, a case cured.—L. ii./04,831. Ⓟ**Hypodermic Injection.** 10% (was 5 grains in 1 drachm), B.P.C. *Dose.*—1 to 6 minims.

Use recently boiled distilled water *q.s.* to form a thin paste, transfer to a funnel plugged with absorbent wool, and gradually add water *q.s.* Ⓟ**Hypodermic Tablets** contain $\frac{1}{12}$ grain of Curare.

Murder conspiracy against the Prime Minister and Mr. A. Henderson. At the Old Bailey in March, 1917, Alice Wheeldon, her two daughters, and Alfred George Mason, chemist and druggist, husband of one of the daughters, were found guilty of poison conspiracy. The unmarried daughter, Hettie Wheeldon, was acquitted. The following sentences of penal servitude were inflicted:—Mrs. Wheeldon, ten years; Alfred George Mason, seven years; and Winnie Mason, five years. It was proved that phials containing solution of strychnine hydrochloride and a preparation of curare had been supplied by Alfred George Mason, who was a lecturer on pharmacy in a technical school at Southampton. The defence advanced the theory that these poisions were intended to poison dogs.

In the course of the proceedings it was stated that no fatal case has been recorded in literature of curare poisoning.

P1 Curarina. $C_{19}H_{26}N_2O$ = 298·323. Another formula:—$C_{18}H_{35}N$. *Dose.*—$\frac{1}{400}$ to $\frac{1}{40}$ grain (?). This, the active principle of Curare, is a powerful poison, in yellowish powder soluble in water and alcohol. Researches on Curare.—P.J., 1890,893,471; L. i./91,46.

Cuspariæ Cortex.—The dried bark of *C. Febrifuga.* *Syn.* Angostura Bark. Stimulant and tonic. In diarrhœa, dysentery and dyspepsia much employed in South America and West Indies. *Dose* of powdered bark, 10 to 30 grains. The Bark is stated to contain Cusparine $C_{20}H_{19}NO_2$, Cuspareine $C_{18}H_{19}NO_2$, and Galipoidine $C_{19}H_{15}NO_3$.

Cydoniæ Vulgaris Semina resemble apple pips. They contain in the epithelium a gum—Cydonin—about 20% of the weight of the dry seeds. One part of the seeds, rubbed in a cloth to free them from dirt, with 40 of water, yields a thick jelly-like mass used as mucilaginous agent in toilet preparations. **Mucilage** of quince is official in some Pharmacopœias, the strength varying from 1 in 25 in the Austr., to 1 in 100 in the Belg. The strength of 1 in 50 of cold water or rose-water is the one generally preferred. Macerate with the cold water for from ½ to 2 hours, and strain without expression. **Decoction** of quince is a similar preparation made by boiling for ten minutes. Glycerin, Carbolic Acid, Boric Acid, Salicylic Acid, Sodium Benzoate, or other preservative is necessary. Such 'Creams' are Medicated with Witch Hazel, Borax, or Tincture of Benzoin. Irish Moss Decoction, 1 in 30 is similarly employed.

Cynoglossum Officinalis, *Hound's tongue* (*Boraginaceæ*). Has demulcent properties. Often acts similarly to Curare.—L. i./06,974.

Had in past days a reputation against hydrophobia. A pill survived in the Pharmacopœia to the middle of the 18th century. This contained Houndstongue, Henbane Seeds, Opium, Mastic, Saffron, Olibanum, Castoreum and Storax.—per C.D. i./13,15

Cyperus Rotundus (*Cyperaceæ*), SINGHALESE **Kalandura.**

A rushlike plant, carminative, stomachic, and hepatic stimulant. A popular remedy in Ceylon. An infusion of the tubers of the plant mostly employed. Increases flow of saliva when chewed. On the intestinal membrane it is astringent and styptic. The natives use it for epistaxis. In dysentery, bronchitis, tonsillitis, and all forms of fever, both alone and in combination with other drugs.—B.M.J. i./07,327. We found the root to contain a considerable quantity of Volatile Oil of odour strongly resembling Sandal Wood **Oil. It is contained in Syr.** Aegle Marmelos Co.

Liquid Extract. *Dose.*—15 to 60 minims 1 = 1 prepared by Alcohol Extraction. This preparation brings out the Santal-like smelling constituent.

Flavoring.—Syl Pini; Extractum Glycyrrhizæ Liquidum.

Gelatin Capsules are prepared containing 5 minims of Liquid Extract.

Cypripedium. *Dose.*—15 grains. Dried rhizome and roots of *C hirsutum* and *C. parviflorum* (*Orchidaceæ*). In nervous affections, hysteria, hypochondriasis and epilepsy. **Cypripedin.** *Dose.*—1 to 3 grains The dried extract of *Cypripedium pubescens*, Ladies' Slipper.

P1 **Cytisine,** $C_{11}H_{14}N_2O$ = 190·187. *Syn.* Ulexine. Is an alkaloid obtained from *Cytisus Laburnum.* It is also present in *Ulex europæus*—the common furze. P1 Cytisine Hydrobromide, a freely soluble salt, *dose,* $\frac{1}{20}$ to $\frac{1}{5}$ grain, has diuretic properties. It benumbs the tongue. The Glucoside contained in small dose produces hyper-excitability. Mild doses feeble cardiac tonic—diuretic.

Poisoning by Laburnum Seeds. Expectant treatment and recovery.—B.M.J. ii./17,676.

Lice have been killed with cytisine *vide* Pediculi, Therap. Ind.

Dammar as used in this country for varnish making and for microscopic work is the East Indian Dammar from *D. Orientalis.*—It occurs in small yellow resinous pieces somewhat larger than wheat. It is partially soluble in alcohol and soluble in chloroform.

Dictamnus Fraxinella. Bastard Dittany (*Rutaceæ*) Root used.

Diplorhynchus Mossambicensis Benth. *N.O. Apocynaceæ.* A small tree with greenish white flowers and milky juice. Widely distributed in South Africa. Known by different native tribes in Rhodesia as Mudgi, Mwengi, Metosa. In Nyassaland it is called Mtonomi. We learn the sap has been very successful in treating eczema, also as a stomachic by the natives. Mixed with ashes the juice has been used to make splints for broken fingers. The juice also is used as birdlime.

Divi-Divi. A dye extracted from the seed pod of a small tree growing wild in the peninsula of Goajira (Venezuela). Latterly it has reached this country again instead of going to Hamburg for distribution.—C.D.

Dragon's Blood.—Resin from *Dæmonorops Draco* is the chief ingredient in mahogany varnishes. Distinguishes Benzine from Benzol, *c.f.* Benzol.

Drosera rotundifolia.—The leaves of Sundew (FR. CX. entire plant), yield a greenish-brown, odorous, very acrid resin, Glucose, Citric Acid, and probably Malic Acid, and a ferment which converts Albumen into Peptone.—B.M.J. i./11,792. Have been recommended for chronic bronchitis, asthma, pertussis, and to ease the cough of phthisis. Tincture, 1 in 10 of proof spirit. *Dose.*—1 to 10 minims. FR. CX. 1 in 5 alcohol 60%. In pertussis, small doses of the 1 in 10 Tincture to be given, 5 minim doses are too large.—B.M.J. i./11,912.

Echinacea Angustifolia. *Syn. Rudbeckia Pallida, Brauneria Pallida,* "Nigger Head," "Black Sampson." The root, powdered, is given in doses of 10 to 30 grains for strumous and syphilitic ailments, to promote the healing of ulcers, and is employed in blood-poisoning in all its forms. In these it is a powerful stimulant to the nerve centres. In the bites of snakes and insect stings the freshly scraped root is applied. It is considered a mild counter-irritant, stimulant and antiseptic, and as a remedy is useful in blood disorders, typhus and meningitis, and externally in the treatment of carbuncles, hæmorrhoids, wounds and impotency.—Am. Jl. Ph., 1911, p. 324. Pharmacognosy of.—Am. Jl. Ph., 1911, p.315.

Fluidextract of Echinacea. is best prepared with a menstruum of Alcohol 4 volumes and Water 1.—Am Jl Ph., 1912, p. 37.

Echium Vulgare (*Boraginaceæ*) **Vipers' bugloss** has some relationship to Curare in action, causes same symptoms as alkanet *q.v.* with more hyperæsthesia and greater weakness of the muscles.—*Vide* L. i./o6,974.

Elaterium (B.P. 1898). *Dose.*—$\frac{1}{10}$ to $\frac{1}{2}$ grain. The dried sediment from the juice of fruit of *Ecballium Elaterium* (*Cucurbitaceæ*). A powerful hydragogue cathartic, useful in renal or cardiac disease complicated with dropsy. In Cyprus we understand the peasants take the fresh juice of the fruits by the nostrils for jaundice.—Ph. Notes. **Pilula Elaterii Composita,** St. Bart's H. Elaterium $\frac{1}{4}$ grain, Compound Extract of Colocynth 2 grains, Calomel $1\frac{1}{2}$ grains, Capsicum $\frac{1}{2}$ grain. **Tinctura Elaterii Composita.** *Dose.*—10 to 30 minims. Elaterium in powder 1, Chloroform 50, macerate 2 days, then add Alcohol (90%) 200, and Compound Tincture of Cardamoms 250, macerate 5 days more and filter. Is more active than a corresponding dose of the powder.

Elaterinum. (B.P., 1898, **U.S.**). *Syn.* MOMORDICIN. $C_{20}H_{28}O_5 = 348{\cdot}324$ *Dose.*—$\frac{1}{40}$ to $\frac{1}{10}$ grain. The crystalline neutral active principle (to extent of at least 20%) of Elaterium, insoluble in water, soluble in chloroform (about 1 in 12) and sparingly in alcohol.

Elaterin contains two substances. Names suggested *a*–Elaterin for the predominant lævorotatory and *β*-Elaterin for the physiologically active dextrorotatory constituent.—Am. Jl. Ph., April, '12,148.

For a full consideration of the Chemistry of Elaterin, see Edn. XV., p. 815

Pulvis Elaterini Compositus (B.P., 1898).

Elaterin 1, Milk Sugar 39. *Dose.*—1 to 4 grains.

Embelia, *Off.* *Dose.*—1 to 4 drachms. Dried fruit of *E. ribes* and *E. robusta* (*Myrsinaceæ*). Anthelmintic, like Kousso or Male Fern. In one case stated failed as a Vermicide.—I.D.C. Contains about 2·5% Embelic Acid $C_{18}H_{28}O_4$—yellow crystals soluble in alcohol, etc. Ammonium Embelate has been used as a tænifuge in dose 3 to 6 grains (0·2 to 0·4 Gm.) with Castor Oil both before and after.

Emblicæ Fructus. *Dose.*—One, two, or more as required. The fruit preserved in syrup, or crystallised in sugar, of *Myrobalanus emblica*, *Emblica officinalis*, Nelli, or Nilicamam. Used in India to excite the appetite, and taken after meals for atonic dyspepsia. In the fresh state, the fruit consists of a fleshy, acidulous pulp enveloping an angular nut. A mild purgative beneficial for children. **Confectio Emblicæ.**—The preserved fruit. *Dose.*—1 or 2 teaspoonfuls. Also prepared **Crystallized** (**dry**). *Dose.*—One, two or more. **Black or Chebulic Myrobalans. Terminalia Chebula** (*Combretaceæ*), is now *Off* was in I.C. Add. The dose of the powder ranges from a few grains to 2 dr. Dried mesocarp of the fruit is employed—astringent in action. Is used as a collyrium in catarrhal ophthalmia, also as ointment to the eye. It is a valuable styptic. Is purgative in large doses ($\frac{1}{2}$ to 2 dr.), but may constipate after purging. Reduces albumin and blood in the urine, and is said to have similar action on glucose.—Ph. Notes, *c.f.*, also B.M.J. i./o7,327 The natives employ this in perineal injuries caused during child-birth, eczematous sores and prolapsus ani—as gargle and dentifrice in spongy gums, and as injection in diarrhœa, internally stomachic and cholagogue.

Unguentum, *Off.* (and CUM OPIO, *Off.*), are equivalent to gall ointment (and with Opium) *Off.*

Entada Scandens (*Leguminosæ*). The Pods and Seeds are used roasted as substitutes for Coffee. Stated to have purgative properties, but this is not confirmed.

PI **Ephedrinæ Hydrochloridum.** $C_{10}H_{15}NO.HCl = 201{\cdot}648$.

The salt of an alkaloid from *Ephedra vulgaris*, var. *Helvetica*, in shining white crystals; very soluble in water; 5 to 10% solution has mydriatic properties.

Equisetum Arvense P. Austr. 'Cat's Tail.' The sterile shoots contain Equisetic Acid, said to be identical with Aconitic Acid.

Erigeron Canadense.—Fleabane. The oil distilled from this herb is official in U.S. *Dose.*—5 to 30 minims. Recent examination showed Sp. Gr. 0·850 to 0·890. O.R. +45° to +77°. Soluble in equal vol. 95% Alcohol. Contains Limonene, Terpineol, Citronellol.—P.R., Dec., 1913, p. 430. Capsules contain 5 minims, and a Liquid Extract of the leaves is prepared. *Dose*—30 to 60 minims. The plant has astringent and hæmostatic properties, especially in uterine, urinary and nephritic affections, dysuria, strangury; also used in hæmoptysis and epistaxis. The fresh herb may yield 0·5% of the Essential Oil, which on keeping will deposit resin and crystals.

Erodium Cicutarium. Storks-bill (Geraniaceæ). A *Liquid Extract Dose* 15 minims three or four times daily, 1 = 1, has been used in Holland with good result instead of Hydrastis. Macerate 100 of the powdered herb in 60 of a mixture of Alcohol 90% and water *p. eq.* for 24 hours. Then percolate until 80 of percolate are secured. Reserve this and percolate to exhaustion. Evaporate this to 20 and add to the reserve.—P. Van der Wielen, Pharm. Weekblad, 1915, No. 51, see also L. H. Van Berk, *ibid.* July i./16, No. 27, C.D. ii./16,912. It has been advised for dropsy.—U.S.D.

Erysimum. *Syn.* **Sysimbrium Officinale** Fr. Cx. *Syn.* Herbe aux Chantres.

An old remedy for hoarseness of voice. It possesses expectorant properties. A proprietary under the name **Sirop d'Erysimum.** *Dose.*—½ ounce thrice daily, preferably in a small teacup of infusion of the same plant, is praised or results in acute and chronic catarrhal laryngitis. Marked influence in cough pain, hoarseness, loss of speech, etc.

Esparto Grass from Spain and N. Africa is a source of wood pulp in paper making. It is boiled with Caustic Soda to dissolve away the fleshy parts, the fibrovascular tissue of the nature of wood being left. It is then bleached. The trade in the grass amounts to 200,000 tons per annum. A by-product of great value in the grass amounting to 3½% is a wax and oil mixture.—C. F. Cross, C.D. i./17,252.

Eucalypti Gummi (B P 98). *Syn* **Kino Eucalypti** (*Off.*). Red Gum. *Dose* —5 to 20 grains in powder.

An exudation from *Eucalyptus rostrata* (*Myrtaceæ*), and other species. 80 to 90% of it is soluble in cold water, almost entirely soluble in Alcohol (90%). Used in diarrhœa, and relaxed throats, and as astringent generally. The liquid extract injected for epistaxis and as hæmostatic.

To be distinguished from the common Australian or Botany Bay kino, said to be principally from *E. resinifera* (*Myrtaceæ*) The latter is very resinous and little soluble in water, was included as **Kino Eucalypti** in **I.C. Add.**

Decoction. *Dose.*—2 to 4 drachms, 1 in 40. Boil and strain. Used as gargle and for diarrhœa. **Liquid Extract, B.P.C.** *Dose.*—30 to 60 minims in water. Eucalyptus Gum 25, Distilled Water 65. Dissolve by constant shaking, strain and add Alcohol 90% 10 and water *q.s.* to 100. A styptic. **Insufflation** 50% in starch. A powerful astringent in hæmorrhage and relaxed conditions of the larynx and trachea. **Suppository,** 5 grains in each with cacao butter (pressed dry). **Syrup.** Liquid Extract of Eucalyptus Gum 5, Sugar 3. Dissolve. *Dose.*—30 to 60 minims. **Tincture.** 1 in Alcohol (90%) 4 by maceration. *Dose.*—20 to 40 minims. 1 to 7 of water as an astringent gargle.

External hæmorrhage of any form could probably be stopped by local use of this tincture combined with internal use of Calcium Chloride. It is exceedingly useful in dental work, and to cuts caused by accidental injury.

Trochisci Kino Eucalypti *Off.* Contain 1 grain in each.

Trochisci Eucalypti Compositi.

Potassium Chlorate 2 grains, Cubeb Powder ¼ grain. Eucalyptus Gum 1 grain with fruit paste, and are marked C.E. Useful in congested and relaxed throats, especially when mucous secretion is arrested.

Eugenol, U.S.—Eugenic Acid, $C_{10}H_{12}O_2$ or $C_6H_3(OH). (OCH_3). C_3H_5$, 4 : 3 : 1 = 164·146.—A colourless oily liquid (B.Pt. 251° to 253° C.), darkening on exposure. It is the chief constituent found in oil of cloves It has a strong clove odour, and is a powerful antiseptic and antiputrescent. Is employed by dentists. Causes reduced sensibility of mucous membrane, but not complete anæsthesia. Useful with wool fat in eczema.

Eupatorium. *Average dose,* 30 grains. Dried leaves and flowering tops of *Eupatorium perfoliatum* (*Compositæ*) Linné. Tonic and diaphoretic; in large doses, emetic and aperient. Employed in dyspepsia, and the infusion (1 in 20 *Dose.*—1 to 4 ounces or more) has been given in tapeworm. **Liquid extract,** 1 = 1. *Dose.*—30 minims.

Euphorbia Peplus (*Euphorbiaceæ*). Petty Spurge, Devil's Milk.

In cases of dyspnœa whether of pulmonary or pneumo-gastric origin. Modifies secretion in asthma and suppresses attacks.

The plant in the fresh condition has an acrid juice, which, when carefully dried, imparts its virtues both to water and alcohol. **Decoction.** 45 grains of the entire herb to the pint. *Dose.*—1 teacupful (diluted if preferred) 3 or 4 times daily, preferably between meals. Flavoured *e.g.*, with Glyl Lavandulæ or Syl Rosæ.

Extract. *Dose.*—7½ to 30 grains. **Tincture.** (1 in 5 by 45% Alcohol.) *Dose.*—30 to 60 minims during the day.

The latex of this euphorbia is *radioactive*—or at any rate will fog a photographic plate. The dried juice retained the action with undiminished effect for months—likewise on charring at 150° to 200° C. the white ash had a slight action (Potash Salts). Screens of Aluminium Foil 0·002 mm. thick made no difference. When 8 layers of the foil were superimposed the density of the image increased (? secondary radiation). The possibility of a gas—*e.g.* Ammonia, producing the effect was excluded by experiment.—Na., June 15 1911, p. 517.

Euphorbia Pilulifera. (*Euphorbiaceæ.*) Australian Snake Weed or Cat's Hair. For asthma, bronchial affections, paroxysmal dyspnœa, laryngeal spasm, whooping-cough, angina pectoris, in coryza, and hay fever.

44 lbs. yielded 1 drachm of Essential Oil—the only substance in it to which medicinal action could be attributed.—C.D. i./13,652.

F. B. Power and H. Browning have examined the drug recently and obtained from it Gallic Acid, Quercetin $C_{15}H_{10}O_7$ and a new Phenolic substance $C_{28}H_{18}O_{15}$ also a glucoside and minute amount of alkaloid. They did not find any constituent to which specific action could be attributed.—P.J. i./13,506.

Extract (Aqueous). *Dose.*—½ to 1½ grains. **Tincture.** *Dose.*—10 to 30 minims. 1 in 5 of alcohol 60%.

Ficus Carica.—The acrid sap of the common fig produces dermatitis on the skin. In Southern Europe the Sap is in use as a counter-irritant or vesicant. Occasionally it gives rise to ulceration.—B.M.J. ii./12,1139.

Fœniculi Fructus. Fennel. Dried ripe fruit of *Fœniculum vulgare N.O., Umbelliferæ* (cultivated) (*Off.*), contains Volatile oil. Congealing point not below + 5° C.—U.S. *Dose.*—5 to 15 minims. Sp. Gr. 0.960 to 0·990. Sol. in an equal vol. of 90% aclohol. Constituent anehol, aromatic.

Given to infants in form of **Aqua Fœniculi.**

Fœnugreek. *Trigonellæ Fœnu-græci Semina* (*Leguminosæ*). The herb is largely grown in India and Egypt. Contains large proportion of mucilage and about 5% oil. Chief use, veterinary. An Egyptian preparation. *Helba*, is made from Fœnugreek Seeds—when soaked they swell into a pasty condition like a pudding—in Cairo this is hawked in the streets, and the cry of 'Helba' is a familiar one. A medical man goes so far as to call it the Quinine of Egypt—it prevents fever, and is valuable in many ways. It is stated to be comforting to the stomach. Stomach complaints in the Cairo district are common—supposed to be due to the water, but more likely from colds and chills. The seeds may be ground to powder and swallowed in about 1 or 2 teaspoonful doses. Or the seeds infused in water for a few hours and the supernatant liquor employed. Or a handful of the seeds is soaked in a basin of water for from 12 to 24 hours ,then removed and placed in an unglazed flower-pot (which has been previously kept under water ½ hour) and allowed to sprout during 3 or 4 days. When the plant has grown to about 2 inches it is ready for use. It is eaten raw along with the seeds. This sprouted remedy is best and most employed. It has been tried in diabetes.—Geo. H. Stephenson, Cairo.

Frangula. *Rhamnus Frangula* Bark (*Rhamnaceæ*), Buckthorn Black Elder or Alder Buckthorn. It grows all over Europe and in America. Should be 1 year old. Contains Frangulin, Emodin, etc. Cathartic especially for hæmorrhoids and chronic constipation. Liquid Extract B.P. '85 and Fluid Extract U.S. 1 = 1. *Dose*, 1 to 4 drachms. Common Buckthorn in this country is *R. catharticus.*

Syrupus Rhamni, B.P.C. *Dose*, ½ to 1 drachm. Is prepared from Common Buckthorn Berries. Evaporate fresh buckthorn berry juice 50 to 30 and set aside 12 hours, filter and dissolve sugar 65 in the filtrate with heat, strain and cool. Mix Strong Tincture of Ginger 0·52 with Alcohol 3·12, add to the Syrup and finally water to 100 by weight.

Fucus Vesiculosus (*Fucaceæ*). **Bladder** or **Sea Wrack.** Preparations of this, being rich in iodine, bromide, and chlorine salts, have had reputation for reducing corpulence. It is stated to contain a considerable amount of Mannite even 12% (?).—L. i./17,323. **Extract, B.P.C.** Exhaust the drug in No. 20 powder with alcohol 45% and evaporate. This contains about 3% of Iodine. (Fucus vesiculosus may contain as much as 0·21% of Iodine. The yield of extract is about 1 from 15). *Dose*, 3 to 10 grains before meals, in pills with althæa. **Liquid Extract,** B.P.C. 1 = 1 of Bladder Wrack in 45% Alcohol. *Dose*, 1 or 2 drachms before meals. It is recorded a lady lost 20 lb. in 9 weeks when taking the liquid extract; and a gentleman 8 lb. in 6 weeks; another 8 lb. in 3 weeks, without bad results.

In thyroid gland disease. In some experiments to determine the smallest quantities of various Iodine Compounds which when given to animals caused distinct changes in their resistance to Acetonitrile and at the same time to find out the maximum effect which could be obtained—bladder-wrack was found to rank first—it increases the thyroid secretion markedly. Iodine compounds affect the resistance of animals to Acetonitrile only through the thyroid gland. The Iodine of Fucus is 80 to 100 times as active as that of any other Compound studied in the investigation.—L. ii./10,842.

Chronic subcutaneous fibrosis treated by Fucus combined with a more or less strict diabetic diet, exercise and massage.—B.M.J. i./11,354.

Galangal (*Zingiberaceæ*). Indian Root, China Root in 2 varieties: 'large' from *Alpinia galanga*, Willd, and 'small' *A. officinarum*. *Dose.*—15 to 30 grains Aromatic tonic. **Contained in 'Hippocras,'** *q.v.*

Galbanum (B.P., 1898). *Dose.*—5 to 15 grains. Gum resin from *Ferula Galbaniflua* (*Umbelliferæ*) and other species. Expectorant and stimulant.

Persian Galbanum. The exact botanical source of varieties is uncertain —P. H. Marsden, P.J. ii. /15,356.

Galega officinalis, or goat's rue, has a reputation as a galactagogue when given to nursing women. An extract is prepared. *Dose.*—5 to 10 grains. **Tephrosia virginiana** is also known as goat's rue, but is not the drug intended for use.

Galium Aparine.—The plant Cleavers or Goose Grass. Is acid, astringent, and diuretic. Has been used in dropsy, jaundice, scrofulous scaly eruptions, epilepsy, and obesity. Succus Galii. *Dose.*—1 to 2 drachms; and Extractum Galii, 5 to 20 grains. For psoriasis.

Galla. *Dose.*—7½ grains. Excrescences on *Quercus infectoria* (*Cupuliferæ*), caused by deposition of eggs of *Cynips Gallæ Tinctoriæ* (*Hymenoptera*), Astringent. Contain Tannic and Gallic Acids. **Unguendum Gallæ** (*Off.* and B.P., '98), 1 to 4 Benzoated Lard.

Gentianæ Radix.—Dried rhizome and roots of *Gentiana Lutea* (*Gentianaceæ*). A bitter tonic. Yields 30 to 40% of Aqueous Extractive.—P.J ii./04,475. This is largely used as a pill excipient. Gentian (P. Jap.) is 'Ryutan.'

Prior to the war came almost entirely from Central Europe but is now imported from Spain in considerable quantities. This should continue.

Prof. Greenish on Powdered Gentian.—P.J. i./12,201.

Gentiopicrin $C_{16}H_{20}O_6$—an 'anthermic' glucoside is contained to extent of 1·5%. Has properties allied to quinine. *Dose.*—20 to 30 grains in malaria. —Y.B.P., 1913,127.

Infusum Gentianæ Compositum (*Off.* and B.P., '98). *Dose.*—½ to 1 ounce. An infusion of Gentian Root, Orange Peel and Fresh Lemon Peel. (Dry may be used in the Tropics.) For dispensing purposes it is convenient to fill strong half-pint bottles, plug the necks well with cotton wool, stand in suitable pan and heat to boiling point 10 minutes and allow to cool. So prepared, will keep for a week and more, and the flavour is not impaired by over-heating. **Infusum Gentianæ Aromaticum.** Brompton H. Gentian Root 2 ounces, Lemon Peel 6 drachms, Orange Peel 3 drachms, Boiling Water 1 gallon. **Tinctura Amara.** P.G. iv. Gentian Root 3, Centaury Root 3, Orange Peel 2, Orange Berries 1, Zedoary Root 1, Diluted Alcohol (67 to 69% volume) to 50. **Mistura Gentianæ Alkalina.** Brompton H. Sodium Bicarbonate 15 grains, Dilute Hydrocyanic Acid 3 minims, Aromatic Gentian Infusion to 1 ounce. **Fluidextractum Gentianæ U.S.** 1=1 by Diluted Alcohol. *Dose.*—15 minims (**0·9 Cc.**). **Elixir Gentianæ Acidum,** Martindale. *Dose.*—1 to 2 drachms in a little water. Concentrated Compound Infusion of Gentian 20 minims, Taraxacum Juice 10 minims, Dilute Phosphoric Acid 2½ minims, Sherry 20 minims, Glycerin 7½ minims.

Preparation of Gentian Extract rich in Gentiopicrin.—P.J. i./12,125.

Geranium Maculatum (*Geraniaceæ*).—Cranesbill root, is a powerful astringent; contains about 16% of tannin; used in diarrhœa, and locally in relaxed conditions of the mucous membranes. Geranin, a dried extract, is given in dose of 1 to 5 grains. Liquid extract, 1=1. *Average dose.*—15 minims.

Ginseng. The name applied in China to roots of probably several plants —four being genuine Asiatic and a fifth the American or False Ginseng from *Panax Quinquefolius*—part of the root has some resemblance to the human frame. To Ginseng is attributed miraculous properties by the Chinese, and it has been worth its weight in gold, but it is little more than a demulcent.—U.S.D. *See* also its culture in Kentucky and its transport to China.—P.J. ii./10,575.

Glaucium Luteum.—Yellow-horned or Sea Poppy. 1 drachm of Liquid Extract in glycosuria gave good results. Hæmoglobin and red corpuscles increased considerably.—P.J. i./99,91; i./00,222. The alkaloids Glaucine, Protopine, $C_{20}H_{17}NO_5 = 351{\cdot}246$, and Chelerythrine, $C_{21}H_{17}NO_4 = 347{\cdot}251$, are present.—Y.B.P., 1902,86.

Gloriosa Superba, *N.O. Liliaceæ.* A poisonous plant common in Upper Burmah. Contains Colchicine.—Clewer, Green and Tutin, J. C. S., 1915, 107,835; F. L. Pyman, C.D., July 31, 15,164.

Glycogen $[C_6H_{10}O_5]n$—A body allied to starch. *Dose.*—1½ to 2 grains. It occurs in the liver, blood, horseflesh, &c It is said to be changed at death into glucose, maltose, and isomaltose; said to improve nutrition.—L.ii./03,345.

Gokhru.—The prickly fruit of *Pedalium Murex.* A remedy for nocturnal seminal emissions, incontinence of urine and impotence. Is rich in mucilage. An infusion 1 in 10 of boiling water (stand 2 hours) Half a pint is a daily dose. Should be freshly made. **Liquid Extract** 1=1, made with Alcohol 90%. *Dose.*—20 to 60 minims. Burra Gookeroo is believed to be identical with *Pedalium Murex fruit.* It is used similarly in India, though by some it is identified as *Tribulus lanuginosus* (*Zygophyllaceæ*). **Guaycuru** (*Statice braziliensis*). Emmenagogue (?) Infusion, taken freely. Astringent. For dysentery.—Ph. Notes, River Plate.

Guarana. U.S., P. Hung. *Dose.*—10 to 60 grains in powder, or infused in a cup of boiling water. The seeds of *Paullinia Cupana, P. sorbilis* (*Sapindaceæ*), roasted and moistened with water, made into a hard paste, rolled into cylinders, and dried. Imported from Brazil. The drug contains 2·5 to 5% **Guaranine,** which is identical with caffeine, *q.v.*, together with tannin, gum, &c. Is recommended for sick-headache. A nervine tonic. *Dose.*—½ to 5 grains or more. U.S. IX· has standard 4% alkaloids. *Assay.*—By shaking with chloroform and ammonia. Methods of preparation of Guarana by the Guarani Indians.—P.J. ii./10,577.

Fluidextract U.S. *Average dose.*—½ drachm. Standardised to 4 Gm (average) Alkaloids in 100 Cc Prepared by percolation with Diluted Alcohol.

Tincture. *Dose.*—½ to 1 drachm Macerate Guarana 1. in Alcohol 60% *q.s.* to produce 4.

Gymnema. *Gymnema silvestris* (*N.O. Asclepiadaceæ*).

A woody climber growing in India and in Africa. The root has been used as a snake bite remedy. Directly after eating one or two leaves it is impossible to taste sugar, though other tastes are not obscured. Thus, pungency alone is detected in gingerbread, and a sweet orange tastes like a lime. The active principle, **Gymnemic Acid,** was discovered by Hooper, and has been used as a remedy for parageusia and hallucinations of taste.

Hæmatoxyli Lignum, Logwood. (*Off.*). The unfermented heart-wood of *Hæmatoxylon Campechianum* (*Leguminosæ*). Of sweetish astringent taste. The fermented chips used by dyers are deep red in colour, have lost the sweet tasteand the hæmatoxylin is oxidised to *Hæmatein*, $C_{16}H_{12}O_6$.

Preparations of logwood, colour the fæces and urine red, and stain linen.

Incompatible with acids and lime water. Certain metallic salts (notably ron) produce blue colour; mercuric salts brown. The decoction is a remedy for diarrhœa and some forms of urinary hæmorrhage. **Liquid Extract, B.P.C.** 1 = 1. *Dose.*—½ to 2 drachms (2 to 8 Cc.). **Extract,** An aqueous extractive completely soluble in water. *Average dose.*—15 grains.

Decoctum Sappan 1 in 20 of **Sappan** Wood (*Cæsalpinia Sappan, Leguminosæ*) is *Off.* and is similar to Logwood.

Hæmatoxylin. $C_{16}H_{14}O_6 + 3H_2O = 356{\cdot}24$. Usually in yellowish granular crystals, slowly soluble in water, easily in alcohol. Alcoholic Solution 0·2% is used as indicator—yellow in acid and purple in alkaline solution. Also for staining in microscopy, *vide Vol. II.*

Harmine. $C_{13}H_{12}N_2O. = 212{\cdot}181$. One of the alkaloids contained in the seeds of *Peganum Harmala.* A strong smelling herbaceous plant *N. O. Rutaceae.* It is the wild Rue of Dioscorides. Found in S. Europe, Asia Minor, Egypt, Arabia, N.W. India and Siberia. Total alkaloids=4% of which 2/3 is harmaline and 1/3 harmine.

Minimum lethal dose of Harmine hydrochloride by subcutaneous injection for frog=0·6 Gm. per kilo, guinea-pig 0·12 Gm., rabbit 0·23 Gm., rat 0·2

Gm., pigeon 0·15 Gm. Minimum lethal dose intravenously 0·03 Gm. per kilo for rabbit, for cat about 0·04.

In mammals Harmine produces fall of blood pressure; cardiac failure is the chief cause of death in Harmine poisoning. Sublethal doses stimulate respiration, lethal doses paralyse respiration. Larger doses produce fall of temperature. Small doses stimulate the contractions and augment the tone of uterine muscle.

Harmine Hydrochloride has strong antiseptic action on amœbæ, but it is very poisonous.

Harmaline is the other alkaloid and is twice as toxic but the pharmacological action is similar. The separation of the two is tedious but the mixed alkaloids are easily obtained from the seeds.

Harmaline hydrochloride $C_{13}H_{14}N_2O.HCl.2H_2O = 280{\cdot}677$. Forms long yellow needles easily soluble in water; closely resembles quinine in pharmacological action and should be grouped with those substances termed protoplasmic poisons. Minimum lethal dose of Harmaline hydrochloride subcutaneously for frogs 0·25 Gm. per kilo, for mammals about 0·1 Gm. per kilo.—J. A. Gunn, Trans. Royal Soc. Edin., 1911, Vol. 47, p. 245; *ibid*. 1913, Vol. 48, p. 83; B.M.J. i./17,474.

The "Indiaman" has reported unsuccessful experiments made with view of using the Harmal plant as quinine substitutes in malaria.

Hedera Helix (*Araliaceæ*), **Ivy**—juice of leaves has been used to ulcers. The berries are said to be purgative.

Hederin—a glucoside with Digitalis-like action, but is injurious to the heart and blood corpuscles.—B.M.J. i./12,61

Heliotropin, $C_6H_3O_2CH_2COH = 150{\cdot}088$. *Syn*. Piperonal, a Methylene derivative of Protocatechuic Aldehyde, when pure is in shining white flaky crystals with Coumarin odour, slightly soluble in water, freely in alcohol, much used in perfumery. Usually manufactured by oxidation of safrol with chromic acid.—P.J. ii./06,377.

Helonias dioica.—False Unicorn Root. Is used in colic and in atony of the generative organs; also employed as an abortifacient.

Hemidesmi Radix.—Dried root of *Hemidesmus Indicus* (*Asclepiadaceæ*). Indian Sarsaparilla. Was known as *Smilax aspera*. Antisyphilitic properties. Infusion 1 in 10 Employed in kidney affections.

Henna, *Lawsonia inermis* (*Lythraceæ*). The powdered leaf is employed as a hair dye, usually in conjunction with indigo, *e.g.*, the following:—Apply a paste of Henna 1, Indigo 2, for varying periods according to the shade required—one hour for light brown. 1½ hours for darker—should be tried experimentally before use. It is employed internally and locally in jaundice, leprosy, and skin affections.

Heracleum Giganteum, allied to Angelica. The acrid sap of, produces, dermatitis.—B.M.J. ii./12,1139.

"**Himalayan Oil**" has been advocated for mental weakness, insomnia neurasthenia, etc., due to shell shock. It is for external application only. The properties of some Himalayan Oils were discussed in S. M. Mitra's paper on "Hindu Medicine," International Congress of Medicine, London, 1913. See Section XXIII, pages 363 to 371 of Congress Report. We had occasion to examine two varieties (one called Anidra) and found them to be fatty (non mineral) Oils with saponification Nos. 191 and 210.

Holarrhena Antidysenterica is abundant in some of the drier forests in Central India. A Liquid Extract 1=1 has been tried in dysenteric infections. Results good. Stated to contain an alkaloid Kurcheine—I.D.C. 1916.

Hordenine. *p*.Oxy-phenyl-dimethyl-ethylamine. $C_6H_4OHC_2H_4N(CH_3)_2$ Alkaloid obtained from barley in the process of malting. Leger, *Comptes Rend*. 142 (1906) 108; 143, 234, 916. *Dose* uncertain, but 1 Gm. doses have been given to a suckling child. Suggested in hyperchlorhydrosis, enteritis and diarrhœa.—Int. Cong., 1909, C.D. i./09,873.

The compound has been synthesised—see Barger, J.C.S. 95 (1908) 2193 also Rosenmund Ber. 43 (1910) 306, and P. May, p. 143. It will be seen the substance bears constitutional resemblance to Tyramine *q.v.*

Hydrangea (*Saxifragaceæ*). A decoction of the plant (*H. Arborescens*) is stated to have been used with advantage by the Cherokee Indians in calculus diseases.—U.S.D. **Elixir of Lithia and Hydrangea.** *Dose.*—1 to 2 drachms. A proprietary preparation stated to contain in an ounce Lithium

Salicylate 12 grains, Lithium Benzoate 12 grains, Hydrangea root 240 grains. A diuretic and diaphoretic preparation for use in gout and rheumatism.

The Canadian Formulary 1910, has an **Elixir** (of different strength to this). Dissolve Lithium Salicylate 600 grains and Lithium Benzoate 300 grains in Aromatic Elixir 25 ounces,—add Alcohol 95% 7½ ounces to Fluid Extract of Hydrangea 7½ ounces and mix all together. *Dose.*—1 to 2 drachms well diluted with water between meals and at bedtime. (Liquid Extract of Hydrangea may be prepared 1 = 1 with 45% Alcohol).

Hydrocotyle asiatica, Ph. Ned. Water Pennywort. This umbelliferous herb is used in India for specific skin diseases, scaly eruptions, and ozæna as an alterative and diuretic, in 4 to 10 grain doses internally; is added to lard as an ointment, also to poultices, and used as snuff in ozæna. Contains 15% of a volatile aromatic oil named Vellarine.

Hydroxylamine, $NH_2OH=33{\cdot}034$, is formed by the action of nascent hydrogen on nitric acid. Its strong reducing properties suggested its use in tinea and psoriasis. It is a strong antiseptic. Does not stain the skin. The HYDROCHLORIDE, $NH_2OH.HCl=69{\cdot}502$, is in hygroscopic crystals, with an acid taste and reaction, freely soluble in water. Solution 1 in 1,000 of equal parts of glycerin and alcohol or ointment with adeps lanæ, successful in lupus, ringworm, and parasitic sycosis. The first few applications (by friction) do not produce smarting, but later ones may.—B.M.J. i./03,545.

Manufacture.—Hydroxylamine is prepared by passing Sulphur Dioxide (4 molecules) into a concentrated solution of Sodium Nitrite (2 moleculces and Sodium Carbonate (1 molecule) at −2° to −3° with constant stirring until just acid. The solution is warmed with a few drops of Sulphuric Acid and then kept at 90—95° for two days. Neutralise with Sodium Carbonate and evaporate until the solution weighs about 10½ to 11 times as much as the Sodium Nitrite originally taken. The Hydroxylamine Sulphate is obtained from the mother liquors and purified by recrystallisation.—Thorpe, Vol. III./87.

Our experience with the method was that after passing in Sulphur Dioxide for 4 or 5 hours the liquid tended to turn brown—then decolorised and crystallised out. More water was added at this stage. The process gives satisfactory result but Hydroxylamine Hydrochloride is difficult to obtain crystalline.

It may also be manufactured by electrolysis of Nitric Acid. The process is conducted in a cathode cell using mercury or amalgamated copper electrodes. The electrolyte is sulphuric acid of over 40% strength and the nitric acid is slowly dropped in, the whole being kept cool. The Hydroxylamine is recovered as sulphate.—P.J. i./16,3. Chemical methods in our experience give poor results.

Hydroquinone. *Syns.* QUINOL, HYDROCHINON (German). *Dose.*—½ to 5 grains $C_6H_4(OH)_2 1:4=110{\cdot}078$. An isomeride of Resorcin $C_6H_4(OH)_2$ 1 : 3, and Pyrocatechin 1 : 2.

Manufacture.—Our experiments in making this suggest the following notes:—Mix Sulphuric Acid 24 lbs. with Water 1 gallon. Allow to cool completely (some hours), then mix Aniline 3 lbs. with Water 2 gallons and add the Sulphuric Acid mixture gradually. Allow to stand until the following day. Add Ice 28–56 lbs. and surround with ice 56 lbs. and salt sufficient to sprinkle the ice. Dissolve Sodium Bichromate commercial 15 lbs. by elutriation in water sufficient to make a saturated solution. Run in one third of this solution gradually and allow to stand two hours watching the temperature (not to exceed 10° C. throughout). Then add the remainder or sufficient quantity until the precipitate is a clear yellow and the mixture is no longer made a brighter yellow. Collect the precipitate; suspend in about a gallon of water; pass in SO_2 until the greenish black colour disappears and the liquor is saturated with the gas and extract with ether twice or three times (or better employ a non-inflammable solvent). Distil off the ether and recrystallise from water acidulated with Hydrochloric Acid, decolourising the solution with animal charcoal in presence of SO_2.

Electrolytical deposition is more economical than the chemical method. Theory of the reaction.—P.J. i./16,3.

Poisoning by Hydroquinone—20 grains recovered from dejecta.—A. Mitchell, & J. Webster, B.M.J. ii./19,465.

It is *Soluble* 1 in 20 of water, also in alcohol about 1 in 4, and ether. It possesses stronger antiseptic and antipyretic properties than Rescorcin, also resembles carbolic acid. Is used as a photographic developer, *q.v.* Qualitative reactions of Pyrocatechin.—P.J. i./07,208,430.

Hysterionica. *Syn. Aplopappus Baylahuen* (*Compositæ*) *Remy.* From Chili. Recommended in malarial and chronic dysentery, flatulent dyspepsia and diarrhœa. **Liquid extract.** *Dose.*—5 to 15 minims.—N.S.D. p. 1394.

P1 Ibogaine. $C_{52}H_{66}N_6O_2$=806·848. An alkaloid recently obtained from the Iboga (*syn.* aboua, or obouete or liboka) (N.O. Acanthaceæ), *Tabernanthe Iboga*, Baill., a plant growing in West Africa, particularly the Congo. In certain districts it is rare and commands a high value. The blacks claim exciting and aphrodisiac properties for it. It has also strong sustaining powers. Too large a dose may produce tetanus and convulsions. The plant has been used with some success in sleeping-sickness. Ibogaine is extracted by making a mash of the powdered root with milk of lime, drying, extracting with ether, and subsequently treating that extractive with 10 per cent. sulphuric acid. The alkaloid and its salts taste somewhat like cocaine. The base is soluble 1 in 28 alcohol 95 per cent. at 15° C. Insoluble in water. Melting-point 151° C. Its solutions are lævorotatory. In solution the substance oxidises, but keeps well in crystalline form. As an anæsthetic ibogaine does not seem equal to cocaine or stovaine, but is a good stimulant of the central nervous system in small doses. It exercises a very strong action on nutrition, augmenting respiratory changes, and the processes of assimilation and rejection It is a muscular tonic, notably a nerve tonic and a heart tonic.

P1 Ibogaine Hydrochloride $C_{52}H_{66}N_6O_2$.HCl=843·316. occurs in white crystalline scales, soluble 1 in 50 water at 15° C., 1 in 1·5 alcohol 95 per cent. at 20° C. Solutions 1 in 50 will crystallise out in the winter. The alkaloid would appear to be valuable in all cases in which, following on an infectious disease, or owing to malnutrition, the patient suffers from nervous depression—in la grippe, angina, and heart affections generally. *Dose* of Ibogaine Hydrochloride 0·01 to 0·03 gram (⅙ to ½ grain) per diem in **Nyrdahl's Dragees** each containing 0·005 Gm. (1/12 grain), *i.e.*, 2 to 6 *pro die*,—Abstract from original of A. Landrin.

Ichthyocolla (P. Belg.). Isinglass. The swimming bladder of certain species of the sturgeon and hake; dried and sliced into thin pieces. About 3 drachms to the pint of warm water forms a jelly. Is used for refining wine. Added to milk to prevent formation of tough curds difficult of digestion. Isinglass Plasters on Muslin, 8 inches wide, yard rolls (also 11 inches by 5 yards). Also Tapes, ¼, ½ and 1 inch, 10 yard lengths. Also Isinglass on Silk, 7 inches wide, flesh-colored, black and white, are made. P. Jap. gives method of making Court Plaster.—"Emplastrum Adhæsivum Anglicum."

Sinclair's Glue.—Glue 50, water 50, glycerin 2, calcium chloride 2, thymol 1. For applying extension in fractures instead of plaster. Melt on water bath when required and apply with the hand using a bandage if necessary.

The following is more elastic:—Isinglass 50, glue 50, water 50, calcium chloride 2, tannin 12, glycerin 2, thymol 1.—B.M.J. ii./17,60.

Inula Helenium (*Compositæ*).—Elecampane. Root contains Inulin allied to Starch, and Helenin. *Dose.*—¼ to 2 grains (**0·016 to 0·12 Gm.**) a stearoptene, in white acicular crystals, insoluble in water, but freely so in alcohol. Is antiseptic, used in ozœna, keeps off insects, and internally for phthisis, malarial fevers, infantile and catarrhal diarrhœa; checks bronchial secretion. **Inulin** from this and from Dahlias and Helianthus the same.—P.J. ii./04,335. Inulin is stated to be present in Burdock root to the extent of 45%, Dahlias 20%.—Holmes.

Extractum Inulæ Liquidum. 1=1 *Dose.*—10 to 60 minims. **Extractum Helenii** (solid) is official in **Ph. Ned.**

Ipomœa batatus is the **Sweet Potato** which is used as a vegetable in many parts of the world—Persia, India, Japan, China, etc. A perennial plant, the tubers being dug and removed from the plant, which is left to grow until replanting is deemed necessary.—P.J. ii./11,417.

Ipomœa purpura. *Syn.* **I. congesta.** *Convolvulus purpureus*, *Pharbitis Hispida N.O. Convolvulaceæ.* (Common Morning Glory.) Stems and roots in S. Africa, under name i-jalapa, used by natives as purgative. Aerial stems contain 4·8% Resin, of which 15·5% was Ether soluble. This and the alcohol soluble portion of the crude resin was markedly purgative in Gm. doses given to a dog. Suggested use medicinally.—Am. Jl. Ph., June, '08, p. 251.

Iridin.—*Syn.* **Extractum Iridis.** *Dose.*—1 to 3 grains in a pill alone or with extract of henbane, or with one grain of Euonymin.

The dark brown powdered extract made with Alcohol 60% from the root of the blue flag, *Iris versicolor* (North America). Has a bitter, acrid taste, possesses cathartic, alterative, and diuretic properties, given in hepatic and intestinal disorders. Constituents, see Am. Jl. Ph., Jan., 1911.

Cholelithiasis successfully treated by 9 grain doses of iridin with urotropin.—B.M.J. i./06,264

Iris Florentina, I. Germanica, &c. (Italy). Yield **Orris Root** of perfumery, containing '**Butter of Orris**' about 0·15%, a sweet-scented fatty substance. *Tinctura Iridis* is prepared from the root in 8 Alcohol 90%.

Sneezing treatment for prevention of adenoids satisfactory. Powdered Orris Root and soap used to lightly touch the nasal septum. It is not sniffed up the nose.—L. ii./18,240.

Ispaghula, *Off.* *Dose.*—45 to 150 grains. Pinkish brown boat-shaped seeds of *Plantago ovata.* (*Plantaginaceæ*). Much valued as demulcent = Linseed or Barley.—Decoctum, *Off.* *Dose.*—½ to 2 ounce. 1·5% in Water Examination of.—P.J./12,414..—F. B. Power and T. Callan —P.J. ii./13,245

Juglandin.—An extractive prepared from the inner bark of the root of *Juglans cinerea*, the North American butter-nut; is an hepatic stimulant and cathartic. *Dose.*—2 to 5 grains in pill. **Spiritus Nucis Juglandis,** distilled from *Juglans regia*, the common European walnut, is an antispasmodic and for checking sickness of pregnancy. *Dose.*—1 to 4 drachms. **Folia Juglandis** are in P. Austr.; also in P. Belg. (and Fluid Extract) and P. Helv. **Walnut hair dye.** Bruise green Walnut shells 16 ounces, with Alum 2 ounces, in a mortar, add Rose Water 4 ounces, macerate 4 days, strain and press. To every 3 ounces of expressed liquid add 1 ounce Eau de Cologne or other alcoholic perfume.—B.M.J. ii./08,124.

Juniperi Oleum. Oil distilled from fruit of *Juniperus Communis* (*Coniferæ*) and 'rectified.'—*Off.* Sp. Gr. 0·862 to 0·890, increasing with age. Soluble (when freshly distilled) 1 in 4 of 95% alcohol, becoming less soluble with age. We found a sample 4 years old was not clearly soluble in any reasonable proportion. The following test would condemn the majority of samples adulterated with Turpentine. "If 50 c.c. be distilled from a three-bulb Wurtz flask, the lowest of which holds 100 c.c., not more than 75% should distil below 180° C.; the residue in the flask should have a specific gravity not below 0·892 and a refractive index not below 1·4950."—Parry. **Spiritus** *Off.*, 1 in 10. U.S. 1 in 20. *Dose.*—5 to 20 minims. **Spiritus Juniperi Compositus** U.S. *Average dose.*—2½ drachms. Oil of Juniper 8, Oil of Caraway 1, Oil of Fennel 1, Alcohol (U.S.) 1,400, Water to 2,000. Terpeneless and Sesquiterpeneless Juniper Oil is stable and soluble in comparatively weak alcohol. **Rob Juniperi, Ph. Ned.** Juniper Berries 3, Water 9. Infuse 12 hours, and dissolve Sugar 10. Evaporate to honey consistence. **Vinum Diureticum,** P. Helv. *Dose.*—¼ to 1 ounce. Juniper 15, Squill 10, Orange Peel 10, Absinthe 5, Angelica 5. Sweet Flag 5, Dry Southern Wine 1,000.

Juniper Oil Standards—The Oil in commerce is a by-product. The specific gravity rapidly rises on keeping, *e.g.*, from 0·865 in Feb. to 0·873 in Dec., 1913; and the solubility diminishes. The relative therapeutic value of the Terpene and Sesquiterpene constituents is under investigation. If the Terpene bodies be those with the therapeutic properties there is very little reason for the use of Juniper Oil in preference to Turpentine.—P.R., Dec., 1913,402.

Oleum Juniperi Ligni. A trade name for Fictitious Juniper Oil supposed to be made from the wood but is generally a mixture of Juniper Berry Oil and Turpentine. *c.f* also Juniper Tar Oil.

Kaladana (*Off.*) *Syn.* PHARBITIS SEEDS. *Dose.*—30 to 45 grains. Dried seeds of *Ipomœa hederacea* (*Convolvulaceæ*). Purgative and Anthelmintic = Jalap.—Give dose 60 to 120 grains.—I.D.C.

Pulvis Kaladanæ Compositus, *Off.* *Dose.*—10 to 60 grains. Kaladana 30%. Equivalent to Pulvis Jalapæ Compositus.

Tinctura, *Off.* *Dose.*—½ to 1 drachm. 1 in 5 of Alcohol 70%. **Kaladanæ Resina.** *Dose.*—2 to 8 grains is also *Off.* Useful hydrogogue.—I.D.C.

Kauri Gum. A resin obtained from *Dammara Australis* in Australia and New Zealand. **Dental Compo.** Contains Kauri Gum. This is used for taking impressions of the mouth and teeth for plate preparation. *Directions.*—Place the cake of Compo in moderately warm water for about two minutes or so to soften—do not employ boiling water. The Compo should be kneaded with the wet fingers until it has hardened somewhat; by this proceeding it becomes almost cool. The Tray should be warmed for a short time before placing the Compo into it. The surface of the Compo is then smoothened with the hand, a little vaseline is rubbed on the surface, and the tray is held for a second or two over a Bunsen flame. It is very important that the surface of the Compo should be heated in this way before inserting into the mouth. After inserting wait for 2 or 3 minutes. On removal, place the tray bearing the impression in cold water.

Kauri 'Gum.' Its collection and commerce.—Jas. B. Aitken, P.J. i./15,550.

Kava-Kava, *Syn.* **Awa Root,** *Off.* was I.C. Add,—*Piper methysticum* (*Piperaceæ*) from the Polynesian Islands. Is used by natives as a sialogogue and to make a fermented drink *v. infra.* Contains an essential oil, two resins and about 1% of a neutral crystalline principle, Kavahin or Methysticin, $C_{16}H_{18}O_5$=290·224, allied to Piperin and Yangonine, melting at 156°, $C_{10}H_3O_3$=176·114. Is a bitter tonic, nerve stimulant and diruetic. Has been used for gonorrhœa, gout, and cystitis, but efficacy against gonococcus is doubted. Extract, hydro-alcoholic. *Dose.*—5 to 10 grains. **Liquid Extract,** *Off.* 1 in 1 of alcohols 90 and 45%. *Dose.*—30 to 60 minims. The exhaustion with weak alcohol after percolating with strong alcohol is wrong as the extract on evaporating the weaker alcoholic percolate is insoluble in the reserved percolate.—H. Deane, P.J. i./15,622. Pill = 3 grains extract. *Dose.*—1 to 3 or 4. Infusion, 1 in 320. *Dose.*—½ pint. Though more palatable than, is not equal to copaiba or santal oil. Is a local anæsthetic to tongue and eye.

The intoxication produced by the drink in question, is wholly unlike that of alcohol, being of a silent or drowsy character accompanied by incoherent dreams.—U.S.D.

Kino (*Off.* and B.P. '98). U.S. *Dose.*—5 to 20 grains. The dried juice from trunk of *Pterocarpus Marsupium* (*Leguminosæ*), *Off.*—Now specified as to commercial varieties. Partly soluble in water, almost entirely in alcohol 90% nearly insoluble in ether. Astringent for diarrhœa, and as **Trochisci** for relaxed condition of the throat. Its powder is also insufflated to check epistaxis. **Tincture** (*Off.* and B.P '98). 1 in 10 of a mixture of Glycerin Alcohol, and Water. U.S. 1 in 20 with Glycerin 3 in 20. *Dose.*—30 to 60 minims. This gelatinises, due to an enzyme in the drug. Instead add Kino 2 to Boiling Water 10. and keep at 100° C. 12 hours. After cooling add Alcohol 10 and set aside 12 hours. Kino is a cheap source of Tannin.—P.J. ii./03.702. ***Incompatible*** with mineral acids and alkalis and with substances precipitable by the tannin it contains.

Butea Gum.—Bengal Kino may be used to replace in certain parts of the Empire.

Klipzweet. This is found as an 'exudate' underneath overhanging rocks in certain parts of S. Africa Contains Manganese and about 16% ether soluble fat. It is made up of wax. honey, waste products of a hive, as well as other secreta and excreta of animals. It is distinct from Hyraceum. *q.v.* —P.J. ii./09,632.

Koromiko—These herbs, *Veronica salicifolia* and *V. parviflora*, imported from New Zealand, are used there and in China as a remedy for chronic dysentery and diarrhœa. Tincture, 1 in 5 of proof spirit. *Dose.*—½ to 1 drachm *V. elliptica* (Forst). Another New Zealand species used; a cultivated plant in certain parts caused poisoning.—P.J. i./09,639.

Krameriæ Radix. Rhatany Root (*Off.*). The dried root of *Krameria argentea* (Para) and *K. triandra* (Peruvian). Both contain about 8% of a tannin. Astringent in relaxed throat, also in tooth powders when gums are liable to bleed, and in mouth washes, also for bleeding from nose and bowels, and for diarrhœa. **Fluid-extract U.S.** VIII. *Average dose.*—15 minims. Strength 1=1 by diluted alcohol. Of deep red colour and astringent taste. **Tincture** (*Off.*). 1 in 5 of 60% alcohol by percolation. *Dose.*—30 to 60 minims. Should yield 5% extractive. ***Flavoring.***—Glyl Menthæ Viridis vel Piperitæ, Glyl Pini; Glycerin, Syrupus Aurantii. **Trochisci** are made with the Extract as also Ⓟ with Cocaine Hydrochloride $\frac{1}{20}$ grain.

Kukui Oil. *Syn.* Candle Nut Oil from New Zealand, Fiji, Hawaii, etc. obtained from the seeds of *Aleurites Tribola*. *Syn.* *A. Moluccana* (in Index Kewensis)—in amount equal to 60·8 per cent. of the decorticated nuts or 19·8 per cent. of the unshelled seeds. Sp. Gr. 0·920—0·9274, S.V. 184—204·2 I.V. 114·2—163·7. It belongs to the class of drying Oils. Medicinally it has cathartic properties. Suitable for soap, varnish making and other uses. Dries more quickly than linseed oil.—B.C.D., Apl. 18, 1913, p. 848.

Labdanum. *Syn.* **Ladanum** the exudate from *Cistus var.* was employed in the war by the Greeks for wounds.—Sir Charles Ballance, L. i./20,5.

Lachnanthes Tinctoria.—Spirit Weed, Red Root. A tincture=1 in 10 of proof spirit of this United States plant; is used to check the cough in phthisis. *Dose.*—1 to 10 minims.—B.M.J ii./95,1470; L. ii./01,1604. References to Alabone's treatment by lachnanthes.—B.M.J. ii./01,747,912,1124, 1868; i./02,101,113. Dr. Latham's report on.—B.M.J. ii./02,146; L. ii./02,72,88

Lactose. — **Saccharum Lactis,** $C_{12}H_{22}O_{11},H_2O$ = 360·252. Milk Sugar *Dose, ad lib.* Used for weakly children. Is said to be a useful addition to Magnesia as a laxative, it increases the solubility of the latter by combination. It is prepared from the whey of milk.

Milk Sugar.—Preparation on commercial scale.—Y.B.P., 1913,139.

The organisms capable of fermenting Lactose are less frequently present in normal mouths than those in which dental caries exists. In the latter the Lactose fermenters are invariably present—a point which must have some bearing on the ætiology of dental caries.—Sir Kenneth W Goadby, International Medical Congress at Budapest. Annus Medicus, L. ii./09,1896.

Diabetics assimilate it in some cases with limited improvement. Aids assimilation of other carbohydrates.—B.M.J.E. ii./15,18.

Mucic Acid. $C_6H_{10}O_8$=210·11. Heat in a large vessel Lactose 1 and Nitric Acid (sp. gr. 1·3) 3 (by weight) for 20 minutes. On cooling the acid crystalises out as a white powder. Wash with a little water. It melts at 213° C. to 214° C. and is soluble 1 in 300 of water. Thorpe directs Lactose 100 Gm., Nitric Acid sp. gr. 1·15, 1200 Cc. heated on water bath till volume reduced to 200 Cc. diluted with equal volume of water and allowed to crystallise.

Laminaria Digitata 'Sea Tangle.' From this seaweed **'Laminaria Tents'** are made for gynæcological and surgical use. Placed in contact with moisture these swell to three times their original size in dry state. The Laminaria is sterilised by drying after immersion in acetone, chloroform or alcohol 90% under pressure at 133° C., or by placing in Saturated Solution of Iodoform in Ether or in Sublimate Solution.

Lappa, Burdock. Roots of *Arctium Lappa*, Linné, or other species of Arctium. On the Continent called Bardana, *e.g.*, *Inj. Bardanæ Spirituos* (external): Bardana 2, water (boiling) *q.s.* to 15, strong alcohol 5, to be rubbed into the scalp. Ph. Notes. Denmark. LIQUID EXTRACT, 1=1 by Diluted Alcohol. *Average dose.*—30 minims. In skin affections and gout.

Lasiosiphon (*Lasiosiphon Meisneri*).

Dose.—2 to 5 grains.

The root of this South African drug resembles Mezereon in its properties (there are several species—this is considered the most active). The bark of the root when chewed produces a scorching sensation in about fifteen minutes —the effect lasting for some hours. The activity is due to a resin which imparts the acrid properties after a time to the saliva.—Am. Jl. Ph., 1911, p. 49.

Tincture of the root 1 in 10 Alcohol 90%. *Dose.*—10 to 60 minims. Found efficacious in chronic skin affections.

Liquid Extract. 1 = 1. *Dose.*—2 to 5 minims. **Lasiosiphon Bassorin Paste,** consisting of the Liquid Extract thickened with 3% Tragacanth; may be of service for local use.

Lathyrus Sativus.—A poisonous horse pea.—P.J. i./13,795.

Lauri Fructus.—*Laurus nobilis* (*Lauraceæ*). The ripe fruit, Laurel or Bay Berries, contains fixed 30% and volatile oil 1%. In rheumatic and similar pains.

Leonotis Ovata (Dutch—Klip Dagga) (*Labiatæ*).

A South African plant with handsome orange flowers in whorls. Has reputation as snake-bite remedy. The three most important S.A. snake-bite plants are *L. Ovata* (infusion of leaves only used), *L. Leonurus* (infusion of root bark only used)—the leaves of this plant are used by the natives as a substitute for Indian Hemp), and *Teucrium Africanum q.v.*—Pharmacy Notes. *v.* also G. E. Oliver, C.D. i./10,780.

Leptandrin.—*Dose.*—¼ to 2 grains. A resinoid powder obtained from Culvers Root, *Leptandra* (*Veronica*) *Virginica* (*Scrophulariaceæ*). It promotes the flow of bile without irritating the bowels; useful in dyspepsia. Acts well with podophyllin. **Liquid Extract.** 1=1 of Leptandra by diluted alcohol. *Average dose.*—15 minims. Solid Extract (Powder form, 1=4) of drug by concentrating same and adding Glycyrrhiza. *Average dose.*—4 grains.

Levisticum officinale.—P.G.V. Lovage. A decoction in milk (a fresh leaf and stalk to a quart), allowed to simmer 2 hours. *Dose.*—3 to 5 ounces. For renal dropsy.

Limonene.—*Dose.*—10 to 20 minims (on sugar or in water).

This Terpene exists in several modifications, the *dextrorotatory* ($[\alpha]_D = +106{\cdot}8^\circ$) is contained in Lemon, Bergamot, etc., Oils, the *lævo* ($[\alpha]_D = -105^\circ$) is in Pine Needle Oil and Peppermint Oils. *Inactive* Limonene (= Dipentene—*i.e.* + and —Limonene in equal amounts) is contained in Oil of Camphor, Swedish and Russian Terpentine Oil, etc. They do not differ greatly in taste and odour.

Limonene has been used in place of Turpentine Oil both by inhalation and internally. Stated to be of value in pulmonary disease associated with copious expectoration, *e.g.*, purulent bronchitis, bronchiectasis, gangrene and phthisical cavities. As a deodorant of foul smelling expectoration it is said to act well. Sputum decreases in amount. The substance is also valuable as a stomachic and externally in stimulating liniments.

Lemon Syrup St. G. H. makes Lemon Syrup thus: Lemon Oil 1 minim, Alcohol 90% 20 minims, Syrup to ½ ounce. Garsed suggests to dissolve Citric Acid 2, in Lemon Tincture 5, strain if necessary, and add Syrup 50.

Tinctura Limonis.—We have found the following formula of P. Boa equal in flavour to the *Off.* formula. He uses Fresh Lemon Peel, cut small, 25, alcohol (90%) 52 and distilled water 48 mixed. Prepare by maceration. This is, therefore, weaker in spirit than the *Off.* For Syrup of lemon.—Citric acid 4 ozs., sugar 5½ lbs., distilled water 42 ozs. or *q.s.* tincture of lemon as above 5 ozs. Heat the water to boiling, add first the sugar, then the citric acid, and stir till dissolved. When cold add the tincture of lemon, and mix by shaking. Finally, add distilled water *q.s* to make to 100 ozs. This Syrup we find as good as if not better than the *Off.* Syrup. It is clearly much easier to make. The taste is sharper—it is somewhat stronger in Acid, we found by titration about 25% stronger.—P.J. i./09,294.

For Oleum Limonis vide Vol. II.

Linum Seeds of *Linum usitatissimum* (*Linaceæ*). Decoction, 1 in 20 demulcent or crushed for use as a poultice. Contains **Oleum Lini,** 30 to 40%. Sp. Gr. 0·930 to 0·940 (*Off.*) I.V. not less than 170. Used as enema, and with lime-water as Carron Oil. *q.v.* **Flax Seed** or Linseed (*Grains de Lin* in France) in habitual constipation. One teaspoonful to be taken floating in a tumbler of water before breakfast.—Med. Press, Nov. 23 1904. Appears to act better than Agar Agar.—B.M.J.E. i./14,59. Tung Oil from *Aleurites Fordii* irritant and poisonous, is a substitute for Linseed Oil.—P.J. ii./07,241. Lewkowitsch gives particulars.

Lobelia (*Off.*) U.S., P. Belg. Dried flowering herb *Lobelia inflata* (*Lobeliaceæ*). Is purgative and emetic, but its only use is to relax spasm of the bronchi in asthma and bronchitis. Contained in many anti-asthmatic powders (*vide* Pulvis Lobeliæ Composita). Ⓟ**Fluidextract,** U.S., 1 = 1. An Acetic extractive. *Average dose.*—8 minims (**0·5 Cc**). Ⓟ**Tincture,** U.S., 1 in 10 alcohol (94·9% vol.). *Average dose.*—Expectorant 15 minims, Emetic 1 drachm. F.I. agreed 1 in 10 Alcohol 70%. Fr. Cx., Max. single dose 30 minims approx., max. during 24 hours 95 minims approx. Ⓟ**Tinctura Lobeliæ Ætherea.** (*Off.* and B.P. '98). 1 in 5 of Spirit of Ether. *Dose.*—5 to 15 minims until nausea occurs. In atonic constipation with dryness of the fæces, the tincture in 10 minim doses combined with cascara useful.—H. Standardisation by its effect on blood pressure and subsequent paralytic action on certain nerve cells is possible.—Dixon, P.J. ii./05,157.

Flavoring.—Syl Carui, Syl Lavandulæ: Syrupus Aromaticus.

Lonicera Periclymenum—Common honeysuckle and *L. xylosteum* (flag honeysuckle).—(*Caprifoliaceæ*) Flowers or berries are poisonous.—L.i./09,932.

Lupulinum. (B.P. 1898). *Dose.*—2 to 5 grains in pill. Yellow powder—lupulinic-glands—separated from the strobiles of the hop—*Humulus Lupulus* (*Moraceæ*). Aromatic and bitter, and contains the properties of the hop—the resin and volatile oil.—Naylor. In insomnia and for alcoholism. Inhalation 30 grains to a pint of warm water. In gastro-intestinal diseases—enteric and dysentery.—B.M.J.E. ii./06,60. Should be fresh. 5 to 15 grain doses. Stimulates the general and local circulation, and improves the tone of the alimentary tract, *e.g.*, with Silver Nitrate, Iron, Quinine, &c.—**Tincture** (P.B. 1898). *Dose.*—½ to 1 drachm. Dried strobiles 1 in 5 alcohol (60%). More aromatic is made from fresh hops. Extractive varies greatly—standard of 4% was suggested. **Hop Pillows** to induce sleep are prepared. **Smoking** the dried strobiles has a somniferous effect.

Liquid Extract. *Dose.*—5 to 15 minims. An alcoholic extract, 1 = 1. **Solid Extract** by concentration. *Dose.*—2 to 6 grains.

Kent Hops contained 2·4% Tannin and 7·9% Ash, Choline, traces of a volatile alkaloid, *l*-Asparagine, Essential Oil and Resinous matter 14%, Potassium Nitrate and Sugar.—P.J. i./13,845.

Lycopodium. The yellow spores of the **Clubmoss** *Lycopodium clavatum* (*Lycopodiaceæ*), a fine powder. As a pill powder, also as a diluent for insufflations for the throat and ear, and as a dusting powder. When ignited it explodes with a flicker. **Tincture.** *Dose.*—15 minims to 1 drachm. Lycopodium first soaked in ether and dried 1, Alcohol (90%) 10. To stop frequent micturition, and irritation of the bladder. In our knowledge a case has received great benefit after Salol, Helmitol, Bismuth, etc., had been found useless.

Lycopodium Spores, microscopy of.—Nature, Mar. 31/10, p. 126.

Use of in quantitative microscopy.—T. E. Wallis, B.P. Conf., 1919.

Lycoperdon giganteum.—Puff Ball. This forms a soft and comfortable surgical dressing. The dusty powder is a powerful hæmostatic.—Whitla

This and other fungi as styptics. History of and recent use. Heating in an oven to render aseptic does not reduce its hæmostatic power. Troublesome bleeding after tooth extraction can be stopped with it. It is not poisonous.—B.M.J. i./13,437.

Maidis Stigmata.—*Syn.* Corn Silk. The thread-like stigmata of nearly ripe maize fruit. Are demulcent and diuretic. Used in cystitis, and nocturnal incontinence of urine. Liquid extract, *dose*, 1 drachm. Infuse corn silk 1,000 twice with water *q.s.* to cover. Evaporate liquor to 400. Cover and add cold water 300, allow to deposit, filter and evaporate to soft extract. Of this 1, with water 10, gives a clear solution. A *Syrup* may be made of Liquid Extract 1, Simple Syrup to 10. On Foods cultivated by the natives in Portuguese West Africa. An interesting summary divided according to their natural orders—Maize is the principal one.—Jl. Trop. Med. May 1, 1907.

Maize or **'Corn' Oil** which is contained to the extent of 3·5 to 6% has been advised as a cheap substitute for Cod Liver Oil in tuberculosis—a palatable and easily assimilable fat.—L. ii./08,405.

P1 **Maidis Ustilago.**—Maize Ergot, Corn Ergot. Is used in parturition in place of ergot. Is said to increase the force without increasing the duration of uterine contractions. *Dose.*—15 to 60 grains. **P1** **Fluid Extract**, ½ to 2 drachms.—Pr. xl. 215.

Manaca.—A portion of the Brazilian root *Brunfelsia hopeana Benth.* (*Solanaceæ*) which has been used in rheumatic affections. Experiments have shewn it to act on the glands, especially the kidneys. **Liquid Extract** 1=1. *Dose.*—10 to 30 minims thrice daily.—N.S.D. It is frequently combined with Salicylates as in the following—a proprietary preparation. **Elixir Manaca** and **Salicylates**; each ounce equals Manaca 80 grains. Sodium Salicylate 64 grains, Potassium Salicylate 32 grains, Lithium Salicylate 8 grains. *Dose.*—1 to 2 drachms.

Mandragora. Mandrake. *M. Autumnalis* (*Solanaceæ*).

The root is often forked and is sometimes similar to the human body in shape. It is poisonous with effects allied to belladonna. Contains an alkaloid.

Mandrake soaked in Port keeps a 70 year old Russian youthful.—B.M.J. ii./19,762. 'X' tried the Port without the Mandrake. Although 30 he looked like 70 the next morning.—*ibid.*, 802.

Manna, U.S. *Average dose.*—½ ounce. Saccharine exudation from *Fraxinus Ornus*, Linné (*Oleaceæ*), and other species. In flattish, somewhat three-edged pieces. Soluble with some residue about 1 in 3: slightly in Alcohol 90%. Contains Mannitol (*syn.* Mannite) (a non-fermentable sugar which does not reduce Fehling's Solution), C_6H_8 $(OH)_6=182{\cdot}142$, to extent of 75%, and Dextrin about 20%. Has mild laxative properties.

Marrubium. — Horehound. Dried leaves and flowering tops of *Marrubium Vulgare*, Linné (*Labiatæ*). *Average dose.*—30 grains. Given in lung affections—has tonic properties. Infusion 1 in 20 of boiling water.

Mastich (P. Belg.), yellow brittle resinous tears obtained from *Pistacia lentiscus* (*Anacardiaceæ*): insoluble in water, but partly in Alcohol 90%; also soluble in Ether 2 in 1 and in Chloroform 2 in 1. **Alcohol Mastichi,** R.D.H.—Mastich 2, Alcohol 90% 1; dissolve. Harvard Liquid is similar; this is employed for covering a cottonwool dressing so as to form a temporary dental covering, *e.g.*, during the treatment of canals with an antiseptic such as Lysoform. **Æther Copal**, R.D.H. (Copal Solution).—Copal 1, Ether 1, dissolve. For covering cement fillings to protect from the saliva. Zanzibar Copal is a fossilised resinous body obtained from *Trachylobium Horniman* *nianum* (*Leguminosæ*); *Vateria indica* (*Dipterocarpeæ*), Indian; the Brazilian is from *Hymenæa* species and other plants. Australian Copal is Gum Kauri, *q.v.*

Microscopic Varnish. Mastich ½ ounce, Caoutchouc 15 grains, Chloroform 2 ounces; macerate and filter. Mastix is official in P. Belg.

Ph. Form. supplies an account of the use of this and other Resins in the manufacture of varnishes, polishes, lacquers, stains, etc.

Constituents of Loango, Sierra Leone and Benin Copals.—P.J ii./10,41,729.

Benzo Mastiche. *Syn.* **✱Mastisol.** (T.M. 336855).—A solution of Mastich in Benzol (with other ingredients) for wounds, for general surgical use, on the battle-field and in major and other operations, etc.—B.M.J. ii./12,976.

It is stated to act as a harmless disinfectant by arresting the micro-organisms on the skin, etc., where applied—virtually entangling them. Its action is rapid and quite painless, excepting for a temporary burning sensation when first applied. There is no danger of eczema which has resulted with use of Iodine. The asepsis produced is absolute. ***Method of use.***—In wound treatment the temporary first aid bandage, if any is removed and even if blood-smeared, is painted straight away with a sufficient covering of the preparation, and then a dressing applied. Slight injuries may have a layer of sterile gauze first to draw off the wound secretion. Previous washing, disinfecting with soap, Alcohol, etc., is not required.—*Zentralblatt fur Chirurgie*, No. 35, 1912. Useful in burns and corrosions of the 2nd and 3rd degree, the whole area being painted over and covered with cotton wool.

Mastich Dressings with gauze bandages to cover the eye.—Oph., 1911, p. 454.

A solution of Mastich 20 in Linseed Oil 1 and Chloroform 50 for treatment of operation wounds has been used.—M., 1913.

Heusner's Glue. Resin (commercial) 50, Venice Turpentine 5, Methylated Spirit 50, Benzene 25. For applying extension in fractures. Also useful substitute for Mastisol.—C. Max Page, B.M.J. ii./17,290.

The following have also been suggested:—

(1) Dammar 250, Castor Oil or Linseed Oil 30, Benzol 700, Sodium Bicarbonate 50, Amyl Acetate a few drops. Set aside for several days with shaking and strain.

(2) Colophony Resin 300, Venice Turpentine 20, Castor or Linseed Oil 10, Benzol 700, Sodium Bicarbonate 60, Amyl Acetate a few drops.—K. Dieterich, P.J. i./15,100.

Mastich Varnishes: various formulæ containing Mastich 20 to 40%. Benzene is preferable to chloroform as solvent. Mastich 20, Resin 20 in Alcohol 60 Cc. stated to be efficient adhesive. Preparations of this kind useful to 'anchor' the aspetic covering of a wound while the man is being removed.—B.M.J. i./15,441. See also Mencière's Solutions.

Pistachia Lentiscus Oil (**Mastich Leaf Oil**) contains Pinene and probably other Terpenes. Has an odour resembling Rue and Savin Oils —Perfumery Record, Dec., 1913.

Melaleuca Viridiflora (*Myrtaceæ*).—Indigenous to New Caledonia.

✱Gomenol (T.M. 215925), a French proprietary, is stated to be a distilled essence of; given in rhinitis, laryngitis, and other diseases of the respiratory system. **Pates Pectorales au Gomenol** are also made. In influenza, bronchitis, and coryza and with Vaseline Oil as Ear Drops.—Ph. Notes.

Melissa Officinalis (*Labiatae*) 'Balm' was official in U.S., 1890, *q.v.* Eau de Melisse des Carmes. *Syn.* Alcoolat de Mélisse composé, Fr. Cx. German *Carmeliter Geist.* Spiritus Melissæ Compositus; digestive; twenty to twenty-five drops twice a day, is also used as an application in rheumatism, etc. Eau de Carmes was first sold by the bare-footed Carmelites, the monks of the New Reform, as they called themselves, who found a home in Paris in 1605—the elixir was introduced in 1611.—C.D.ii./09,819, *q.v.* for more on historical aspect.

Mediæval occultists made an Elixir Vitæ of this called Ens Melissæ.

Mentha Piperita (*Labiatæ*) **Peppermint.**

OLEUM MENTHÆ PIPERITÆ is distilled from the fresh flowering plant rectified if necessary. Sp. Gr., 0·900 to 0·920. Soluble 1 in 4 of 70% alcohol. Should contain at least 50% menthol, free and combined, and not less than 5% of esters (calculated as menthyl acetate) *Off.* A sample of English Oil we examined 1914 had Sp. Gr. 0·908, and the *Off.* solubility in alcohol. Further dilution produces turbidity. **Spiritus** (*Off.*) 1 in 10 alcohol 90%.

In coryza the use of this oil instead of menthol is advised. Warm a few drops and inhale. This effected a clear passage in nostrils where same were occluded by swelling of the mucous membrane. Completely removed concurrent headache from pressure in the frontal sinuses. In the early stages of colds with congested mucous membrane and watery discharge most successful. The point is to continue treatment after the nose has become clear and not to allow the passage for air to become obstructed again for some hours.—B.M.J. ii./11,72.

Aqua Menthæ Piperitæ Concentrata. This in commerce is a solution of the Oil in Alcohol. Ph. Form. gives Peppermint Oil 100 minims, Light Magnesium Carbonate 2 drachms, Alcohol 90% 3 ounces, Water 1 ounce. For dilution 1 to 39. *c.f.* also p. 166.

Menthæ Viridis Oleum, is distilled from fresh flowering Spearmint. Forms a clear solution with an equal vol. of 85% alcohol, the solution becoming turbid on further dilution. (The turbidity is noticeable with a double volume of alcohol.—W.H.M.) Soluble 1 in 3 of 90% alcohol.—*Off.* We found this correct with a sample under examination.— 1914.

Menyanthes trifoliata. *Syn.* Trifolia Fibrina, P.G.—Bogbean Leaves or Buckbean. Are bitter tonic, emmenagogue, antiscorbutic, vermifuge and febrifuge; large doses are purgative and emetic; contain Menyanthin, $C_{30}H_{46}O_{41}$ =630·518, a glucoside. Infusion 1 in 20. *Dose.*—2 to 6 ounces, taken hot, early in the morning daily, useful for functional amenorrhœa.—L. i./85, 132·235. Liquid Extract with Liquorice, 1 in 2. *Dose.*—½ ounce. The leaves are in P. Dan. Variation during the year of carbohydrate content.—Y.B.P., 1913, 138.

Methyl Chloridum CH_3Cl = 50·489. This gas made by distillation of Methyl Alcohol, Sodium Chloride, and Sulphuric Acid is supplied compressed in cylinders. As local anæsthetic it is valuable in neuralgia, sciatica, rheumatism. Spray the part for 5 or 6 seconds only.—If effect too strong, apply Glycerin.

Beet Molasses contain 10% of nitrogenous matter and on distillation with time yield Methyl Alcohol and Trimethylamine. The latter on treating with Hydrochloric Acid under pressure at 350° C. yields Methyl Chloride which is used in dye manufacture and for refrigerating.—Martin's Industrial Chemistry, Organic, 1912,376.

Mezereum U.S. *Average dose.*—7½ grains. Dried bark of *Daphne Mezereum* (*Thymelaceæ*) and other species. Fluidextract, U.S., is 1=1 Hydroalcoholic. Contains a crystallisable substance (Daphnetin), which is isomeric with Æsculin (*q.v.*). Has been used as an epispastic for many years past, and stimulant.

Mollinum. *Syn.* **Salve Soap - Unna.** Prepared by boiling Lard 400 with Caustic Potash 56 in Water 400 and Alcohol 90% 40. Allow to stand 12 hours at 50—60° C., then add Glycerin 150. A white soap, containing about 12% excess of fat. As a basis for ointments for rapid absorption. It is readily washed off with water, with which it forms a lather. It leaves the skin fresh and supple, and makes no grease spots on linen. **Mollinum Hydrargyri** and **Mollinum Potassii Iodidi** contain 33% and 10% respectively of mercury and potassium iodide. Not incompatible with mercuric chloride. Is used with respectively 3 to 5% of phenol and salicylic acid and thymol, and with birch tar 10 to 20% for psoriasis; with 30 to 50% of sulphur or 10% of storax for acne and scabies;—with 5% of chrysarobin or naphthol; and with 10% of ichthyol, resorcin, iodoform, naphthalene or white precipitate.

Monsonia ovata. A Cape Geranium. Is closely related to and used in same manner as Geranium Maculatum.—N.S.D. A South African plant used as a native remedy for dysentery. Tincture, 1 in 8, Alcohol (90%). *Dose.*—1 to 4 drachms every 3 or 4 hours. Liquid Extract 1 = 1. *Dose.*—10 to 30 minims.—In dysentery with excellent result. Must be used fearlessly as to dose. Effectual in 3 days where Ipecac. and Bismuth fail.—R. A. J. Asbury, L. ii./15,1318. **Monsonia biflora.** As prophylactic to hæmorrhage in enteric fever at the seventeenth or eighteenth day, contains an active principle *entericin*—neither alkaloidal nor glucosidal. *Dose.*—½ to 4 drachms every 4 to 6 hours.

Mori Succus. — Mulberry Juice. *Dose.*—1 drachm. The juice of the fruit of *Morus nigra* (*Moraceæ*). Mild laxative Used in the form of **Syrupus Mori.** Mulberry juice 20, heat to boiling point and filter Dissolve sugar 36 in filtrate and add Alcohol 90% 2½ to the liquid.

Moschus (B.P 1898), **Ph. Ned.** Musk. *Dose.*—5 to 10 grains. The dried secretion Grain Musk from the preputial follicles of the musk deer, *Moschus Moschiferus* (*Ungulata*). This is believed to be wrong—the Secretory Gland is a *special* Gland.—*c.f.* Fr. Cx. A useful nerve stimulant in cases of exhaustion in fevers and blood poisoning. Of value both for nervous excitement or nervous collapse. Is effective in obstinate hiccough and infantile convulsions. **Mistura Moschi.**—Musk 5 grains, Gum Acacia 5 grains, Syrup of Orange 1 drachm, **Rose Water** to 1 ounce. **Tincture,** U.S.—1 in 20 Alcohol 50% approximately. *Average dose.*—1 drachm. A Tincture of Artificial Musk has been used in whooping cough. In cardiac failure of acute pneumonia with camphor in pill.—West, Pr., Apl., '08,435. We have known 10 grain cachets to be successful in pneumonia.

A powerful heart stimulant. 1 grain with 1 grain quinine in a pill every four hours. Worth trying in influenza.—A. Ransome, B.M.J. i./19,307.

The odour of Musk is due to muskone $C_{15}H_{28}O$ or $C_{16}H_{30}O$.—Thorpe, 1912, Vol. III , 553.

The butyl derivatives of many aromatic nitro-hydrocarbons are sold as **Artificial Musk.** Musk Baur, trinitro-meta-butyl toluene $C_6HCH_3(NO_2)_3C(CH_3)_3$, is formed by nitrating m-butyl-toluene with fuming nitric and sulphuric acids.—Thorpe, 1912, Vol. I., 586.

Muira - Puama.—This drug, which comes from Brazil, has been described as belonging to *Liriosma Ovata*, Miers (fam. *Olacaceæ*). The drug is said to contain an alkaloidal crystalline substance, an amorphous bitter substance, a little fat, and two kinds of resinous acids. A careful examination which we conducted did not confirm the statement as to the presence of an alkaloid. The samples of roots which we examined were, however, obtained in the ordinary way of commerce, and as these Brazilian drugs are much confused (different plants go under the same name in different provinces) it is just possible that one of the number of plants sold under the name Muira may contain an alkaloid. It has an irritating action, also tonic aphrodisiacal properties. Efficacious in the treatment of nervous disorders.—F.N., 1906.

Pilula Potentiæ Composita contains Muira Puama Extract 1 grain with Ovolecithin 1 grain. A useful nerve stimulant and aphrodisiac. *Dose.*—3 to 6 per diem before meals.

Myricin, *Dose.*—2 to 5 grains. The powdered extract of *Myrica Cerifera.* An astringent and stimulant, and in large doses, emetic. For diarrhœa and jaundice.

Myristica Nutmeg (*Off.*). *Dose.*— 5 to 15 grains (**0·3 to 1·0 Gm.**). Dried seed of *Myristica fragrams* (*Myristicaceæ*) with testa removed. Aromatic and carminative. Contains **Nutmeg Oil.** *Syn.* **Ol Nucis Moschatæ.** *Dose.*—½ to 3 minims. Colourless or yellow with Sp. Gr. 0·870 to 0·925. Soluble in 3 volumes of 90% alcohol. Has properties representative of the seeds. The expressed or concrete oil of nutmeg of yellowish colour contains **Myristicin** $C_{12}H_{14}O_3 = 206 \cdot 172$. It is occasionally employed as a gentle local stimulant. **Spirit of Nutmeg** (*Off.*). *Dose.*—5 to 20 minims. Notes on the various forms of Mace of commerce.—Holmes, P.J. ii./08,652. Poisoning by nutmeg—three cases.—B.M.J. i./09,1005. Although Oil of Nutmeg and Mace only cause fatal poisoning in a rabbit in doses of 10 to 12 Gm., and a single nutmeg is capable of producing serious effects in man, it should be remembered that Oil of Nutmeg is very variable, some containing hardly any myristicin. The narcotic property of Nutmeg is attributable to myristicin, and it appears from experiments on animals that this substance when associated with the other constituents of nutmeg is more readily absorbed than when in the pure state. The lower animals are much less sensitive to the direct action on the cerebral function than man. Nutmeg does not appear to contain any other substance of physiological action on animals.—Am. Jl. Ph. Dec., '08,563.

Linimentum Myristicæ L.H.—Oil of Nutmeg 1, Olive Oil 3.

Terpeneless Nutmeg Oil, 1 is about equivalent to 5 of the original Oil.

Ceratum Nucistæ. *Syn.* *Muskatbalsam.* **Stomachic Balm** P.G.V. Yellow Wax 2, Arachis Oil 1, Oleum Myristicæ 6, melted together and strained and moulded into tablets—used for rubbing abdominal region in infants (Hager).

Myrrha *Off.* *Dose.*—5 to 20 grains. Yellowish or reddish gum resin from *Commiphora Myrrha, Off.*, (*Balsamodendron Myrrha*, B.P. '98), and other species. Soluble in water to the extent of about 50% (forms whitish emulsion on trituration with), the remainder being mostly soluble in alcohol 90%. It is soluble in alkalis, *e.g.*, Potassium Carbonate. A favourite constituent in mouth washes, *e.g.*, Tincture of Myrrh and Borax, 1 of each in Eau de Cologne 20. Constituents of **Myrrh, report on.**—P.J. i./06,128. See also Allen, 1911, Vol. IV., 98. **Nitric acid should give with genuine myrrh a transparent**

dirty yellow liquid. False myrrh may give a bright yellow solution, and bdellium is not dissolved. P.G.V. test—not more than 65% insoluble in boiling Alcohol, Ash 7%.

Tincture (*Off.*), 1 in 5 alcohol 90%. ***Flavoring.***—Glyl or Syl Menthæ Piperitæ or Lavandulæ; Extractum Glycyrrhizæ Liquidum.

For recent description of the literature of Myrrh, *see* E. M. Holmes, P.J. ii./13,116.

Myrtillus (*Vaccinium Myrtillus*).—Bilberry or whortleberry, the Blueberry of Canada. An extract or jam has been employed with good results in dysentery, and has been painted on the tongue in stomatitis. It is said to be of great value in typhoid, rendering the intestine aseptic. Suppositories containing 1 Gm. of the extract, and a liquid extract 1=2 of bilberry are prepared. An enema is also used. *Dose.*—2 ounces p.d. The fruits are in P. Austr.

In chronis colitis the preserved juice and the liquid extract of the berry are excellent—G. W. Major.

Myrtol.—A constituent of myrtle oil; has been recommended in putrid affections of lungs and air passages. Expectoration lessened, but no effect on bacilli. *Dose.*—5 to 15 minims on sugar. **Capsules** contain 2 and 5 minims.

P1 **Narceina.**—$C_{23}H_{27}NO_8$, $3H_2O$ = 499·389. *Dose.*—⅙ to 1 grain. An Opium Alkaloid soluble in alcohol, hardly in water. Hypnotic sedative of doubtful utility. P1 **Narcyl** is Ethyl Narceine Hydrochloride $C_{25}H_{31}NO_8HCl$ = 509·851. *Dose*, divided, up to 1 grain per diem. White crystals, analgesic, slightly stimulant—not hypnotic. Action is similar to morphine but is not largely used in medicine.

Niccolum.—Ni = 58·68. A constituent of German Silver:—Nickel 2, 3 or 4, Copper 8, Zinc 3½. The nickel coins in Germany consist of Copper 3, Nickel 1. **Bromide.**—$NiBr_2 + 3H_2O$ = 272·568. *Dose.*—1 to 5 grains. Is in green deliquescent crystals soluble in water and in alcohol. To be given diluted. In epilepsy, 1 grain pills, action same as that of Potassium Bromide. **Sulphate.** $NiSO_4,7H_2O$ = 280·852. *Dose.*—½ to 2 grains after meals. Greenish crystals, very soluble in water. Has been used in chlorosis (like iron augmenting number of blood corpuscles), amenorrhœa, splenic enlargement, and in locomotor ataxy. Resembles zinc sulphate in the fact that it is a nervine tonic and astringent. Allays nervous excitement and pain, particularly useful in cases where opiates cause vomiting, headache, and skin itching.

FOR **Other Nickel Salts**, *vide* Edn. XIV., p. 717.

P1 ***Nicotina.**—*Syn.* PYRIDYL-METHYL-PYRROLIDIN. $C_{10}H_{14}N_2$=162·182. *Dose.*—⅛ to 1 grain. Colourless liquid (Sp. Gr. 1·011) volatile alkaloid (darkens in time) from Tobacco (*Nicotiana Tabacum*). Has been used hypodermically for tetanus. *Antidotes.*—Emetics, stomach-pump, Tannic Acid (small quantities repeatedly) stimulants.

Infusum Tabaci 1 in 20 has been ordered as an ingredient in a hair lotion thus—Cantharides Tincture 3, Sal Volatile 3, Lavender Water 3, Tincture of Strophanthus 2, Glycerin 2, Tobacco Infusion (1 in 20) *q.s.* to 64.—B.C.D. i./15,363.

Toleration to nicotine. Normal animal tissues have the power to destroy a small quantity of the alkaloid nicotine. The tissues of animals which have been rendered tolerant to nicotine destroy a considerably larger amount. There is evidence to show that the destruction of the nicotine is not due to a chemical combination with the tissues, but that, on the contrary, it is brought about by ferment action.—W. E. Dixon. Somewhat similar toleration is that of Alcohol and Morphine—these become oxidised.—Na., Mar. 16, 1911, p. 101.

The action of Nicotine and other pyridine bases upon muscles and on the antagonism of Nicotine by Curarine.—Nature, Mar. 17, 1910, p. 87.

Perfusion of the heart with Nicotine, animal experiments.—L. ii./17,759.

The *Lancet* Laboratory conducted an enquiry into the toxic factor in Tobacco. There is difficulty in estimating Nicotine in presence of Ammonia. In the method employed Nicotine was separated from the latter by means of Iodine. Pipe mixtures contained the largest amount of Nicotine (2·04 to 2·85%), Egyptian, Turkish and Virginian cigarettes came next with 1·38 to 1·8%. A British cigar contained less (1·24%) and a Havana cigar least of all (0·64%). The cigarette (from any tobacco) yields least of its Nicotine to the *smoke*, while the pipe yields a very large proportion (70 to 80% in some cases) of its Nicotine to the smoke reaching the mouth of the consumer. Cigarette smoke contains, however, Furfural (a harmful substance) especially the cheap Virginian cigarettes—this is practically absent in the smoke both of the cigar and pipe. Further the cigar, pipe and Egyptian and Turkish cigarettes all yield Ammonia, which is an antidote to Furfural and Aldehydes generally (see also L. i./10,662—Thiocyanates). The cheap Virginian cigarettes contain very little Ammonia. (It must be further remembered that it is so often the cigarette smoker who is guilty of excess.)—L. i./12,944 ; ii./12, 547,1823. For percentage of Nicotine in Tobaccos see also B.M.J. i./09,911.

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*Agricultural and Horticultural Poison. See note under Arsenic, p. 172.

The view is expressed that there must be some other toxic effect in Havana cigars as, though the Nicotine content is low, they are not tolerated so well as the mild British cigars.—L. ii./12,1511.—See also *ibid*, 1410.

Nicotine nearly equals adrenalin in power of raising blood pressure. Tobacco must be barred where raised high tension indicative of danger.—Brunton, L. ii./08,1132. The influence of Tobacco as cause of arteriosclerosis. *c.f.* p. 561.

Nicotine Manufacture.

Dissolve commercial Tobacco extract in water made strongly alkaline with Caustic Soda and extract with Petroleum Ether. Shake out latter with Dilute Sulphuric Acid. Make this acid liquid alkaline with Sodium Hydrate and again extract with Petroleum Ether. Distil off and rectify the alkaloid in a current of Hydrogen.—P.J. i./13,357.

Tobacco smoke is powerfully germicidal containing *inter alia* Pyridine a potent germicide. It rapidly destroys the cholera vibrio. During an epidemic of cholera in Hamburg not a single workman engaged in the cigar factory was attacked by the disease. Later it was stated amongst 5,000 cigar makers only eight cases and four deaths from cholera occurred. Tobacco smoke also destroys the bacilli of pneumonia.—L. i./13,406.

P1 **Nicotine Salicylate.** $C_{10}H_{14}N_2.C_6H_4OH.COOH = 300·265$. White crystals freely soluble in water. 1% Ointment in skin affections useful.

P1 *✱'X.L. All' (T.M. 239016 Class 2.) Fumigator contains Nicotine 37.3%, Camphor 34·3%, Alcohol 15·1%. Caused poisoning.—L. ii./06,1144, *c.f.* Edn. XII., 496. Horticultural use of Spray, Fumigant, and Paste.—P.J. ii./08,722.

A Solution of one ounce of Nicotine in ten gallons of water is used as an insecticide for hop-spraying—500 gallons are used per acre. It is the best insecticide as it kills apple and plum aphides. It is also used as a sheep dip. —C.D. The addition of Saponins to Insecticide Emulsions is an advantage.—

Fruit growers, etc., complain there is difficulty in obtaining supplies of tobacco extract. A variety of tobacco known as *N. rustica* might be permitted to be grown and denatured with Sulphur or some other mixture which would ruin it for smoking or other illicit purposes.—C.D. i./11,51.

Ocymum Viride (*Labiatæ*). **Basil Plant** so called **Mosquito Plant**—was thought to have repelling effect on Mosquitos. Others say that it neither repels nor attacks, in fact the mosquitos just ignore its presence. The Oil contains 32% Thymol, to which effect may be due.—L. i./11,1095, 1172; C.D. i./11,547.

Œnanthe Crocata (*Umbelliferæ*). Water dropwort—the most dangerous and virulently poisonous of all British native plants. It contains no alkaloid. Cane Sugar to the extent of 3·8% of the dried material was deposited in a crystalline form from an alcoholic extract of the plant. A yellow essential oil with unpleasant odour was also obtained from this extract. The portion insoluble in water consists of a viscid resin amounting to nearly 3% of the weight of the plant taken.—P.J. ii./11,296.

Stated to contain a toxic principle as a neutral resin, probably identical with or including the so-called Œnanthotoxin, giving rise to convulsions by cting on the spinal medulla. Has poisoned children, being mistaken for Angelica. The roots resemble parsnip and are not unpleasant to the taste.

Oleum Crotonis (*Off.*). *Syn.* **Oleum Tiglii, U.S.** *Dose.*—½ to 1 minim Fr. Cx. gives max. single dose 0·05 Gm. (=1 minim approx.). Max. during 24 hours 0·1 Gm. (=2 minims nearly). Expressed from seeds of *Croton Tiglium* (*Euphorbiaceæ*). Sp. Gr. 0·940 to 0·960. A sample we examined, 1914, had Sp. Gr. 0·946. *Soluble in* Ether and in Olive Oil. A powerful skin irritant, will blister, and even cause suppuration and scarring. It has been found possible to immunise animals to the poisonous effects of Croton Oil by gradual ncreasing dosage of 'Crotin,' *vide* U.S.D. Has been employed in Tinea. The **Liniment** well diluted may stimulate growth of hair on bald patches. Also used as a counter-irritant, but may produce powerful inflammation. In pneumonia of great benefit. Pr., April '08,443. Internally so violent a purgative that it is rarely given except to lunatics for obstinate constipation, and in cases of apoplexy (one or two drops placed on the back of the tongue). May be given as **Compound Castor Oil Capsules,** *q.v.* ***Antidotes.***—Olive Oil or milk as diluent. Opium to relieve pain and irritation.

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*Agricultural and Horticultural Poison. See note under Arsenic p. 172.

ABOR ARROW POISON is believed to be a paste made by pounding the soft parts of Croton Tiglium.—B.M.J. i./12,14; P.J. i./12,125.

Oleum Croton Elliottianus TO BE CALLED 'OLEUM ELLIOTT' to distinguish from Croton Oil (*Off.*). *Dose.*—1 to 3 minims. *Capsules* are prepared containing ½ minim in each. *Dose.*—Two capsules at night for laxative effect. Three to five capsules for effective purgative action.

The oil of the seed of this East African plant has Sp. Gr. at 15° C. 0·9242 to 0·9246, Acid value 15·5 to 15·9, Saponification No. 188·5 to 189·4, Iodine Value 143·0 to 147·5. The yield of oil from the seed is about 30%.

Medicinal action.—According to the recent investigations of a well-known physiologist the oil given as such (not in capsule) has an acrid action on the soft palate and causes eructation shortly after taking a dose—this is in great measure prevented by giving in capsules. A dose of ½ minim usually produces no evacuation but two to three ½ minim capsules produce a copious softened evacuation. Three capsules to 5 as stated are an effective purge. Six produce abundant watery evacuation in 3½ to 4 hours (no griping).—Nov. 1916.

Oleum Graminis Citrati (*Off.*). INDIAN OIL OF VERBENA or LEMON GRASS.—Distilled Oil from entire herb. Characters.—P.J. ii./08,623. Carminative, with agreeable odour, contains Citral, Citronellal, &c.—E.P.I. i./243.

Oleum Rhodii.—The source of 'Lignum Rhodii' of the older writers has never been accurately determined. One writer says the wood was brought from the Canary Islands, *e.g.*, the wood of *Convolvulus Scoparius* and *Convolvulus Floridus.* Another suggestion is, that the wood used was *Genista Virgata* or *G* (now *Cytisus*) *Canariensis.*—E. M. Holmes, P.R., Feb., 1911.

Ononidis Radix, P.G.V., Ononis Spinosa, L. Rest-harrow Root (*Papilionaceæ*) contains several glucosides. Infusion 1 in 10 five ounces *pro die* as diuretic and blood purifier.

Origanum Majorana (Sweet Marjoram) and **O. Vulgare** (French Codex Common Marjoram) (*Labiatæ*) have been used medicinally. Value is attributed to the essential oil contained. Superseded by Oil of Thyme (*q.v.* Thymus Vulgaris), which is often called in commerce Oil of Origanum. For a statement of the commercial history of this controversy, see P.J. ii./10,760.

Oil of Sweet Marjoram is obtained from the fresh flowering herb (*O. Majorana*), which is grown chiefly in Spain. It has Sp. Gr. 0·890 to 0·910. Its constituents are Terpinene, Terpineol, Terpine, Hydrate, Borneol and Camphor.

For "*Oil of Origanum*" several species are used, *e.g.*, in Trieste *O. Onites* and *O. Hirtum.* In Asia Minor various species. Cyprus Oil is obtained from *O. Majaranodes* and contains 80% Carvacrol, Sp. Gr. 0·960 to 0·970. Trieste Oils have Sp. Gr. 0·940 to 0·980. Phenols 60 to 85%; Smyrna Oils Sp. Gr. 0·915 to 0·945. Phenols, 25 to 60%. *Cyprus Oil is soluble* 1 in 2 to 1 in 3 in Alcohol 70%. It also contains Cymene, a characteristic Terpine Origanene, and a small amount of another Phenol considered to be Hydroxymethoxycymene which gives a violet colour with Ferric Chloride.—E. M. Holmes, P.R., 1913,4,74,389; Y.B.P., 1913,85; C. T. Bennett, P.R., Nov. 13,389.

Aromatic Tonic. Carvacrol preponderates in all these Origanum Oils whilst Thymol preponderates in Thyme Oil.

A parcel of French Oil imported under the name Origanum Oil (Marjolaine), was not from Origanum but from Calamintha Nepeta.—E. M. Holmes, P.R., Dec., 1912, 322

Orthosiphon Stamineus. N.O. *Labiatæ.* First imported from Java but it is widely distributed in the East also. Contains a glucoside. Tincture of leaves 1 in 10 of S.V.R. An aqueous extract—in diabetes.—C.D. '19,580.

Pœonia Officinalis. The red peony of the gardens. The root has acid taste. The Greeks possibly used it as a wound-dressing—Sir. Chas. Ballance, L. i./20,5.

Pareira (B.P., 1898). *Average dose.*—30 grains. Dried root of *Chondrodendron tomentosum. Uses.*—Similar to those of Buchu. Employed in chronic inflammation of the genito-urinary tract. **Extractum Pareiræ Liquidum** (B.P., 1898). *Dose.*—½ to 2 drachms. Extract the Pareira Root in No. 40 powder with boiling water. Evaporate the liquor until it contains

33⅓%extractive matter. Add to 3 volumes of such, Alcohol 90% to produce 4. For *Greenish's formula—vide* P.J. ii./04,701. Recent examination of the root alkaloids Beberine and others *see* Arch. Pharm., 250, 684.

Patchouli—Genuine Patchouli is from Pogostemon Patchouli (Bell) *Labiatæ.* The yellow volatile oil is contained in the glands in the epidermal cells, in the hairs and in the central leaf tissue. The chief supplies of the leaf come from the Straits Settlements, and recently from the West Indies. Description of various Patchoulis of Commerce.—Java from Pogostemon Heyneanus, Khasia from Microtæna Cymosa, Chinese M. Robusta, etc. Contains Cadinene 40 to 45% and Patchouli Alcohol.—E. M. Holmes, P.R., 1913,369,390 (C. J. Bennett), 418.

Pepo, U.S.—Ripe seed of *Cucurbita Pepo* (*Cucurbitaceæ*), Pumpkin. *Average dose.*—1 ounce. Said to be a good remedy for tapeworm, given before breakfast, followed by coffee and later a brisk cathartic. The oil suggested.—B.M.J. i./09,71, but the opinion is expressed that any value that the seeds may possess when given in substance in this way must be attributed to mechanical action.—Am. Jl. Ph., Oct., 1910, 484.

Periplocin.—A yellow coloured glucoside from the bark of an asclepiad *P. Græca.* Soluble in Water and Alcohol. Heart tonic. Subcutaneously maximum dose 0·001 Gm. in 1 Cc. Normal Saline. Injections may be given every two or three days. One hour after injection slowing of pulse and blood pressure rises. Tone improves, diuresis gradually increased, but only when retention is due to heart affection, not in kidney, etc., disorders. Occasionally there is intolerance locally, hence endonasal applications have been advised to replace. For this method, which is active and not dangerous, dose *pro die* is 0·0005 Gm. introduced in Aqueous Solution 0·01%—*i.e.*, 5 Cc. for a dose with a fine atomiser into the nose and respiratory passage. After one or two injections pulse becomes fuller and increases in frequency.

Even after small doses arhythmias and the slight pseudo-anginas from which neurasthenics often suffer decrease. For use in asthma, also in intestinal atony, enteritis and arteriosclerosis.—Merck's Berichte, 1912, p. 110, and M. Index.

Phaseolus Radiatus.—The fruits called by the Malays Katjany-idgo beans have been used in beri-beri with encouraging results. Known as a remedy since 1747, when it was used by Rumulus, a Dutch medical man. 150 Gm. daily given; result to be looked for in 14 days.—'La Caducée,' March, 1905,79.

The beans when used to add to rice to diminish the chance of infection by beri-beri (*q.v.*), have an unpleasant flavour and natives avoid eating them if they can. They are boiled into a sort of porridge with rice (even polished rice may be used) in the proportion of ⅓ pound of beans to 1⅓ pounds of rice. This reduces the unpleasant flavour. If to this treatment 7½ grains of Quinine be given every fifth and sixth day, the chance of malaria is also minimised. The rice should, if possible, be freshly husked daily after the manner of the natives and not of the polished variety—from an account of a successful expedition in Dutch New Guinea.—L. ii./11,1571.

Phlorhizin, $C_{21}H_{24}O_{10}2H_2O = 472{\cdot}329$. *Syn.* PHLORIDZIN. A glucoside from various rosaceous trees, in pinkish-white crystals, sparingly soluble in water, in alcohol 90% 1 in 4 ,and in ether, and induces artificial diabetes (glycosuria) in doses of at least 15 grains. The drug is a valuable mild tonic suitable for children ; a substitute for quinine. *Dose.*—Tonic 5 grains, Antiperiodic, 15 grains. Diminished Phloridzin glycosuria indicates disease of the kidney, and complete absence of sugar should be regarded as a sign of advanced renal disease.—L. i./07,717, and also *Vol. II.*

Phytolaccin. *Dose.*—1 to 5 grains. Extractive from *Phytolacea Decandra*, Poke Root (*Phytolaccaceæ*).—U.S. VIII. Has emetic, cathartic and alterative properties. Has been used in rheumatism and syphilitic affections. A tincture 1 in 10 alcohol 45%. *Dose*, 3 to 10 minims. **Fluidextract,** U.S., VIII., 1=1 by Diluted Alcohol. *Average dose*, Emetic 15 minims; alterative 1½ minims. Locally for painful mammæ.

Pichi.—Leaves and twigs of *Fabiana imbricata* ; useful in gravel and some kidney diseases. **Liquid Extract.** *Dose.*—10 to 60 minims. Has given good results in gonorrhœa and cystitis. **Tablets of the Solid Extract** containing 4 grains equivalent to 1 drachm of Liquid Extract are preferred by patients, and have been found useful in genito-urinary diseases. In gonorrhœa with lymphangitis, œdema, etc., good results. **Compound Tablets of Pichi Extract.**—4 to 8 grains with Salol and Tannin of each 2 grains useful to combat bacteria.—F.N., 1909.

Picrorhiza (*Off.*).—*Dose.*—10 to 60 grains. Dried rhizome of *P. kurroa.* (*Scrophu ariaceæ*). Tonic, antiperiodic, aperient.—This and Amphicome Emodi are called Kaur. Inferior to quinine.—I.D.C.

Ext. Liquidum (*Off.*). *Dose.*—15 to 60 minims. 1 in 1 Alcohol 60%.

Tinctura (*Off.*). *Dose.*—½ to 1 drachm. 1 in 4 Alcohol 45% (was 1 in 8).

[P1] **Picrotoxinum** (B.P. 1898). $C_{45}H_{50}O_{19}=894{\cdot}625$, probably consisting of 2 molecules of Picrotoxinin $C_{15}H_{16}O_6=292{\cdot}203$, with 1 molecule of Picrotin $C_{15}H_{16}O_7=310{\cdot}219$. Picrotin is said to be comparatively inert.—Y.B.P., 1913,208

Dose.—1/100 to 1/25 grain. Fr. Cx. *Max. single dose.*—1/32 grain, max. during 24 hours 1/10 grain approximately. A neutral crystalline principle obtained from the fruits of *Anamirta paniculata* (*N.O. Menispermaceæ*)—or Cocculus Indicus (growing on the Malabar Coast); does not form salts. Nearly entirely soluble 1 in 330 of water, and 1 in 13 of alcohol 90%, and about 1 in 500 of fats; its taste is bitter. Picrotoxinin has M.pt. 201° C. and Picrotin 249° C. The combined substance melts at about 200°. Lævorotatory, $a=-29{\cdot}26$ at 16° C. (Absolute alcoholic solution of 4·1 Gm. in 100 Cc.).—Fr. Cx.

Gives good results in checking night-sweats (does not like Atropine cause dryness of the throat), also employed in epilepsy and chronic alcoholism: overdoses cause stupor, delirium, and convulsions (by acting on the medulla). It increases the secretion of the mucous and perspiratory glands. Its action in checking night sweats is explained by Cushny as probably due to its increasing the respiration and thus preventing that stimulation of the nervous mechanism of perspiration which occurs through the partial asphyxia.

Antidotes.—Administer emetics, use the stomach tube, then give Chloral and Potassium Bromide, then stimulants.

Ⓟ**Hypodermic Injection.**—1 in water 36 *Dose.*—3 to 6 minims.

Ⓟ**Liquor.**—Picrotoxin 1, Glacial Acetic Acid 30. Dissolve and add Distilled Water to 250. Filter. *Dose per os.*—2 to 12 minims in water. Is palatable and keeps in solution at all temperatures.

Ⓟ**Pills** of 1/30, 1/50, 1/60, or 1/100 grain form suitable doses for checking night-sweating of phthisis taken for 2 or 3 nights successively. The drug is slightly cumulative, may thus be temporarily stopped with effects persisting. A pill of Picrotoxin 1/60 grain, Atropine 1/120 grain with Agaricin 1/12 grain, is said to act even better.

In addition to the body Picrotoxin which occurs in the seed only, the tasteless alkaloid Menispermine has been found in the pericarp of the fruit.

'**Menispermin,**' an extractive substance (powdered) obtained from various species of *Menispermum*. *Dose.*—1 to 5 grains. A tonic laxative, diuretic, stimulant said to be of value in indigestion. Beer and rum were impregnated with cocculus before the Food and Drugs Act came into force.—Pr.,Feb./09,266.

Pimento (Allspice). Dried full-grown unripe fruit of *Pimenta officinalis* (*Myrtaceæ*). From W. Indies. **Oleum Pimentæ.** *Dose.*—½ to 3 minims. Sp. Gr. 1.030 to 1·055 O.R., 0° to—4°; R.I. 1,508 to 1,535; Solubl 1 in 3 of 70% alcohol. Eugenol content not less than 60% by volume.

Stomachic, and antispasmodic.—Put into hollow teeth to relieve pain.

A snuff composed of Powdered Pimento with addition of 3 minims of Eucalyptus Oil to the ounce is advised for hay fever to promote a healthy discharge of pituitary mucus in which the pollen grains are killed and washed away. The allspice is a local stimulant and antiseptic—the latter quality being accelerated by the co-operation of the Eucalyptus Oil.—J. Sawyer, B.M.J. ii./10,16.

Causes of Variation of the Oil.—P.R. 1918-9, 278, *See* also Y.B.P. 1919, 75,

Pinus Canadensis.—The hemlock spruce of the U.S.A. *Syn.* Abies Canadensis. A fluid extract is used as an astringent in leucorrhœa; and given internally for diarrhœa, hæmoptysis, and night sweats. *Dose.*—10 to 60 minims, also a distilled colourless variety in commerce.

Pinus Strobus. White Pine of America—the Syrup of the bark of which in that country enters frequently into Cough Syrups.—L. ii./09,203.

Piperina. $CH_2O_2.C_6H_3.CH : CH.CH : CH.CON.C_5H_{10} = 285{\cdot}247$. *Dose.*—1 to 10 grains. A crystalline principle from black and long pepper, the fruits of *Piper nigrum* and *Piper longum* (*Piperaceæ*) in large colourless prisms, which turn yellow with keeping. Melts at 130° C. (266° F.) Insoluble in water, soluble in alcohol, and less soluble in ether. At first tasteless, but on prolonged contact it develops biting taste; it has febrifuge, stomachic and antiperiodic action. **Oleoresina Piperis.** *Average dose.*—½ grain. Is prepared by acetone extraction of pepper.

Piscidia Erythrina. Jamaica Dogwood (where it is used as fish poison Extractum (Alcoholic) from the bark. *Dose.*—2 to 5 grains, and Liquid Extract 1=1. *Dose.*—20 to 120 minims. In neuralgia, toothache, bronchitis, pertussis, insomnia, and dysmenorrhœa.

Pistoia Gout Powder.—One formula says composed of Calumba and Patchouli only. Several authorities, however, give (which is more often used) Bryony Root 2½ drachms, Gentian 2½ drachms, Chamomile 2½ drachms, Colchicum Root 5 drachms, Betony Root 10 drachms. Mix and divide into 365 powders. *Dose.*—1 to be taken each day of the year in a full glass of hot or cold water.—Ph. Form. A slightly varied formula.—B.M.J. i./09,852. Have also been advocated for rheumatism.

Platinum. Pt. = 195·2 Sp. Gr. 21·5. This metal is capable of being heated to very high temperature without melting. It resists all acids except Aqua Regia and is hence used to make analytical apparatus. **Platinic Chloride** $PtCl_4,2HCl+6H_2O$. Precipitates Ammonium and Potassium from Solutions. (*Off.*). Solution of Platinic Chloride is 5% in water. Has been given in syphilis in ⅛ to ½ grain doses. **Potassium Chloroplatinite.** K_2PtCl_6. Reddish brown crystals soluble in water. Used in photography in acid toning baths.

Rhotanium. An alloy of the rare metals with properties similar to those of Platinum. Used for making crucibles, dishes and the like for analytical laboratory purposes.

Polygonum Hydro-piper L. (*Polygonaceæ*) WATER PEPPER.

A nostrum for diabetes was found to consist of the dried leaves of this drug, which has a biting taste. It apparently caused a patient to be unstable on her legs and produced excited condition and dilatation of the pupils. *P. hydropiper* has been used for dropsy and the allied *P. Aviculare* for difficulty in passing urine—both appear to have some action on the kidneys.—L. i./11, 281.

Populin. — Benzoyl-Salicin, $C_{13}H_{17}(C_7H_5O)O_7+2H_2O$ = 426·308. From *Populus tremuloides* (*Salicaceæ*). *Dose.*—1 to 4 grains. Has antipyretic properties. A simple way of producing synthetic Populin.—P.J. ii./04,233.

Pruni Virginianæ Cortex. *Syn.* WILD CHERRY BARK.

The bark of *Prunus serotina* (*Rosaceæ*) contains amygdalin; on distillation with water it yields an essential oil rich in hydrocyanic acid; on moistening the bark with water, the odour of the latter is developed (*vide* also Amygdala Amara). It possesses bitter tonic properties, with more or less sedative ones. The preparations in use—the tincture and syrup—are used to palliate the cough in phthisis, pertussis and bronchitis, in palpitation of the heart, and debility particularly of the digestive organs. The Syrup is also a useful flavouring agent.

Ⓟ**Tincture** (*Off.*). *Dose.*—30 to 60 minims.

Virginian Prune Bark, now approx. 1 in 5. 10% Glycerin approx. used as an addition. Ⓟ**Syrup** (*Off.*). *Dose.*—½ to 1 drachm. Virginian Prune Bark, 15%. U.S. is similar.

Ⓟ**Syrupus Benzaldehydi Hydrocyanicus.**

Dose.—½ to 1 drachm. Saturate Distilled Water 10½ with Benzaldehyde dissolve Sugar 15 in the liquid, and add 0·01 per cent. of Hydrocyanic acid Except for the colour, which could be adjusted, this preparation correspond closely to the Syrup of Virginian Prune.—Rutherford Hill.

Psyllii Semina.—The small dark brown seeds of *P. pulicaria* from S. Europe. The testa contains a large amount of mucilage. A **Mucilage** or **Decoction,** 1½% is employed in France as a demulcent drink similarly to the Ispaghula preparation in India. They are about half the size of Ispaghula Seeds.

Psyllium appears to act better in correcting constipation than Agar Agar and Linseed as regards weight increase in fæces.—B.M.J.E. i./14,59.

Pterocarpi Lignum. Red Sander's Wood. Heart wood of *Pterocarpus santalinus* (*Leguminosæ*). Contains santalin, and is used as a colouring agent in compound tincture of lavender.

Pulegium. Pennyroyal (*Labiatæ*). Oleum Pulegii, Oil of Pennyroyal, Sp Gr. 0·927 to 0·962 Rotation + 13° to + 35° often adulterated.

It comes from Spain, S. France and Algeria, and contains 80% Pulegone.—P.R., Nov., 1913. Encourages menstruation—administered in form of a hot tea at bedtime. Is reputed to produce abortion. This is distinct from the oil passing under that name in U.S. VIII., *i.e.*, **Oleum Hedeomæ** from *Hedeoma*

Pulegioides (*Labiatæ*) indigenous in N. America, which has similar properties. It is similar in composition.—*ibid.*

Poisoning by Essence of Pennyroyal—4 drachms taken—caused delirium and Camphor taste in the mouth. Hot tea given produced profuse vomiting. The toxic effect is produced by the Oil after the solvent Alcohol has been removed in the stomach. As a general treatment give an emetic and avoid Alcohol.—B.M.J. ii./13,746.

For *midge bites* the following is claimed to be both preventive before going out or may be rubbed into the bites when inflicted to allay itching. Ol. Pulegii ½ drachm, Tinct. Absinth. (1 in 8) 3 dr., Lin. Saponis, Lin. Camph. Ammon. of each equal parts, to 3 ounces. *Aqueous* solutions give little relief as they do not penetrate the skin.—L. i./13,1783.

Pulque is the fermented sap of *Agave Americana* and *A. Mexicana* (*Amaryllidaceæ*). Contains *inter alia* the phosphates of Magnesium, Potassium, and Calcium, and 7% of Alcohol. It stimulates renal activity, is a powerful nutritive, has been used in Bright's disease, is laxative and diuretic.

On Pulque and Pulque drinking in Mexico. The Maguey (*A. Mexicana*) flowers once in seven or ten years. Description of method of cultivation and collection of the juice with process of fermentation. The Pulque is drunk in Mexico city like beer in this country. Consumption is stated to be about 2 quarts of fresh juice per day per head. It cannot be transported any distance. It contains about 4½% Alcohol.—C.D. i./10,54. L. i./12,43.

Succus Agavæ Concentratus *Syn.* **Agmel.**

Dose.—½ ounce in half tumbler of water three or four times a day between meals.

Maguey juice is a concentrated condition. Indicated in forms of acute and chronic congestion of the kidneys—in nephritis and in disease of the bladder and urethra. It is stated to have marked power in correcting and altering metabolism and in restoring kidneys to health and active function. Activity thought to be due to certain enzymes.

• **Pulsatilla.**—*Anemone Pulsatilla* (*Ranunculaceæ*). *Syn.* **Pasque Flower.** The entire herb is used. Contains Anemonin, a crystalline substance. **Liquid Extract.**—1 = 1. *Dose.*—2 to 5 minims. Tincture 1 in 10, Alcohol 60%. *Dose.*—5 to 30 minims. In dysmenorrhœa and amenorrhœa.

Pyrethri Flores. The dry flowers of *Pyrethrum roseum* and *P. carneum* in powder as a dusting powder to keep off insects. Those from Dalmatia are from *Pyrethrum cinerariæfolium* (*Compositæ*). A Tincture, 1 in 4 Alcohol 60%. is used as an insecticide lotion. The powdered drug may be puffed from bellows into the room to kill mosquitoes.

Dalmatian Insect Flower prefers sunny, pebbly, calcareous hill-sides dry and without irrigation and a fairly dry atmosphere. The seed in commerce is apparently dried by heat to prevent germination. Details of culture. Suggestion that it would be worth trying here.—E. M. Holmes, P.J. i./17,7

Pyrethri Radix.—Pellitory Root (*Off.*), U.S. Fr. Cx. *Average dose.*—30 grains. Dried root of *Anacyclus Pyrethrum* (*Compositæ*). A useful sialogogue, causing considerable salivary effusion: is used in the form of tincture 1 in 5, might be made with 60% alcohol.—P.J. ii./09,142. U.S Alcohol 94·9% vol. Must be given with caution to children, as it is powerful in effect. **Glycogelatin Pastils** are made containing 1 grain of the powder for dryness of the mouth. To promote a continuous flow of saliva and thus irrigate the ducts and so prevent ascending infection. Severe hæmatemesis is often followed by inflammation of the parotid glands. *S. pyogenes aureus* and *M. lanceolatus* found in the pus.—B.M.J i./09,1297.

Tinctura Pyrethri Composita. Tincture of Pyrethrum (Root) 2, Clove Oil 1, Camphorated Chloroform 1. As tooth-ache drops.—C.D., Oct. 21,16.

Pyridina. Fr. Cx. $C_5H_5N = 79{\cdot}075$. *Dose.*—5 to 10 minims daily increased. A colourless alkaline liquid Sp. Gr. 0·980 with persistent odour, miscible with water and alcohol, boils at 243° F.; obtained from many organic substances by dry distillation; is contained in and combined with nicotine in tobacco smoke. Purified by shaking with moist magnesium hydrogen phosphate and then dehydrating with caustic potash. It is probably the relieving agent of various cigarettes and powders smoked or burnt for asthma and whooping cough. A drachm of it is placed on a plate in a small room in which the patient remains from 20 to 30 minutes three times a day. Is employed for making Denaturalised Alcohol in Germany.—*See* Alcohol. It is a very powerful cardiac depressant. Valuable in increasing tension of an eye in danger of destruction from infection. Some remarkable cures effected with it. Must be free from ammonia and amines.—J. Burdon Cooper.

Quassia (*Off.*, and B.P. '98).—Jamaica Quassia. Wood of *Picræna* (or *Picrasma excelsa* (*Simarubaceæ*). Contains picrasmin. Infusion 1 in 100. Chiefly employed as a bitter tonic. ***Flavoring.***—Syl Vanillæ, Syl Rosæ; Syrupus Zingiberis. Liquor Quassiæ Concentratus 1 in 10. Tincture 1 in 10. Alcohol 45%. By rectal injection the daily use of a strong infusion will get rid of tapeworms and threadworms. *Surinam Quassia* (not now in use) is the wood of *Q. amara* (U.S.), a branching shrub, whereas *P. excelsa* is about 100 feet high. **Extractum Quassiæ**, U.S. VIII., aqueous extract made up with milk sugar. (Powder form 1=10 of drug). **Fluidextract**, U.S., VIII., 1=1 Hydro-alcoholic. *Average dose*, 8 minims. Quassia is free from tannin, hence campatible with ron preparations as tonic.

Lotio Quassiæ. Concentrated Quassia Infusion 1 ounce, Spirit of Rosemary 1½ drachms Sassafras Oil 30 minims, Alcohol 2 drachms, Liquefied Carbolic Acid 2 drachms. Water to 6 ounces. Shake before use. For nits in children's hair.—P.J. i./11,88. The wood contains **Quassin,** $C_{10}H_{12}O_3$ (?)=180·146 which forms lamellar crystals, soluble about 1 in 400 of water, soluble also in acid and caustic alkaline solutions. Increases secretion of salivary glands and kidneys, and stimulates digestion. *Dose.*—$\frac{1}{30}$ to $\frac{1}{3}$ grain.

Quassia Suppositories containing ¼ grain Extract with gela in basis (15 minim size) are prepared. These have been found valuable for removal of thread worms in young children. Infantile fits in hospital practice are often due to worms. These suppositories are simple and convenient to use in comparison with Enemata. The strength may be increased.

Quassin, Fr. Cx. has formula $C_{32}H_{42}O_{10}$=586·496. *Max. single dose.*—$\frac{1}{16}$ grain. P.J. ii./08,487, goes very fully into the composition of 'Quassin' from Surinam Quassia, and from Jamaica Quassia. See also *ibid.* pp. **30** and **103.**

Threadworms discharged on the third day by 2 grain Quassia Extract Pills. (Keratin coated)—one morning, noon and night. Previously 2 ounces of compound decoction of Aloes.—B.M.J. i./07,932.

Anti-smoking Gum.—Quassia made up in form of a chewing gum—a substitute for smoking for the use of patients suffering from tobacco amblyopia who feel the loss of their tobacco. Finely ground Quassia 1 in gum mass 12 is not too strong for excessive smokers, particularly if there be an alcoholic complication. Where this is absent 1 in 20 is strong enough. It creates appetite.—C.D. i./09,373.

Quebracho (*Aspidosperma Quebracho*) Bark from Argentina contains $\boxed{\text{P1}}$Aspidospermine supplied as $\boxed{\text{P1}}$Sulphate $(C_{22}H_{30}N_2O_2)\,_2H_2SO_4$=806·816. Tonic, febrifuge and antispasmodic. *Dose.*—$\frac{1}{64}$ to $\frac{1}{32}$ grain. In heart affections with dyspnœa. Ⓟ Tincture of Quebracho 1 in 5 alcohol 60%. *Dose.*—½ to 1 drachm. Ⓟ Liquid extract 1=1. *Dose.*—5 to 10 minims.

Quercus Cortex P.B., 1885, P.G.V. The dried bark of young branches and twigs of *Quercus robur* (L.). This is the European or British Oak. *Q. alba* was official in U.S. VIII.

Quillaia saponaria (*Raseaceæ*). (*Off.*, and B.P. '98). *Syn.* Panama Bark (Soap Bark). Contains quillaic acid, $C_{19}H_{30}O_{10}$=418·335 and sapotoxin, $C_{17}H_{26}O_{10}+H_2O$=408·309, closely allied to saponin. Has a sweetish but acrid after-taste and possesses emulsifying properties, causing frothing in water in which it has been macerated. Its lather kills pediculi of scalp. Soap-bark has been used as an expectorant in bronchitis, contra-indicated in inflammation of the intestines or stomach, or ulcerated condition of the mucous membrane. Is used for emulsifying tar preparations. TINCTURE (*Off.*, and B.P. '98), 1 in 20 of Alcohol (60%). Five minims of this will emulsify 1 drachm of fixed oil. Fluidextract, U.S. VIII. 1=1. *Average dose.*—3 minims. The powder has very marked sternutatory properties. Acne Lotion—Decoction of Quillaia 4 ounces, Eau de Paris 60 minims, Ammonia Solution 40 minims. Use night and morning.—C.D. ii./95,1052 It has poisonous properties.

Will emulsify Lemon Oil—thus for a 'Syrup of Lemon' take Lemon Oil 1, Quillaia Tincture 1, Water 14, shake and add Syrup 236, also Tolu Balsam; thus for a 'Syrup of Tolu' take Tolu Balsam 6, Fluidextract of Quillaia 1, Alcohol 90% 5. Dissolve and add Syrup 180, shake and filter.—C.D. i./07,241.

Ranunculus Ficaria (N.O. *Ranunculaceæ*. *Syn.* PILEWORT or *Lesser* CELANDINE. This drug has been used in the form of ointment. It is prepared by digesting the fresh Pilewort with melted lard 24 hours, and straining after the manner of Savin Ointment. **Suppositories** are made containing 72 grains of the ointment and 18 grains of Spermaceti; also, more convenient, a smaller size, containing 45 grains of the ointment and 15 grains of Spermaceti; have been employed in hæmorrhoids. (Advocated by Sir J. Sawyer).

For some historical notes on the drug *vide* L. i./17,42.

Resina (*Off.*, and B.P. '98).—From the crude oleo-resin of various Pines after distilling Oil of Turpentine. Yellow resin soluble in Alcohol 90%, Ether and Benzol. **Unguentum** (*Off.*), contains Resin, Yellow Beeswax, Lard and Olive Oil. CERATUM, U.S. White Wax 3, Benzoated Lard 7. OLEUM RESINÆ EMPYREUMATICUM, P. AUSTR. Brownish oil by distillation of colophony. Sp. Gr. 0·96—0·99, Saponification No. 4 to 12. Iodine No. 50 to 80.

Rhus aromatica. (*Anacardiaceæ*) (Sweet or Fragrant Sumach). The bark of this Canadian and U.S. plant contains Tannin and Volatile Oils. *Dose.*—5 to 30 grains has given results in incontinence of urine.—B.M.J. ii./09,752. Said to act on the muscle fibre of the bladder. **Liquid Extract** 1 = 1. *Adult dose.*—10 to 30 minims. 5 minims thrice daily to children under two years, and 10 minims to children 8 years.

Rhus Toxicodendron. (*Anacardiaceæ*). *Syn.* **Poison Oak.**—Poison Ivy Leaves. Contains a poisonous tar or wax of a glucosidal nature.—P.J. ii./09, 325. 'Rhus Tox' is only poisonous to people with a delicate skin. The best relief is obtained by moistening a crystal of washing soda and rubbing it over the affected part. Tincture of Serpentary and Tincture of Lobelia have also proved effectual.—E. M. Holmes, "Daily Telegraph," Aug. 14, '08. There was a common idea that handling the plant caused eczema. Pfaff and his pupils showed that Toxicodendrol—a non-volatile oily substance was the poison.—P.J. ii./09,532. **Tincture.** *Dose.*—2 to 15 minims. Imported from North America, prepared from fresh leaves 1, alcohol 2. Used for rhuematism in chronic skin affections, paraplegia, and incontinence of urine from atony of the bladder. Also for hæmorrhoids. Whitla says it gives satisfaction, but may irritate stomach and bowels. Botanical description of the plants and means of distinguishing from harmless Ampelopsis.—Holmes, P.J. ii./08,231; L.i/08,887.

The poisoning by Rhus takes the form of an itching, burning, erythematous and herpetiform rash. The eruption spreads from the wrists to the eyelids and face. Papules, vesicles and bullæ are quickly formed, involving more or less the whole body. The skin on hands, forearms, face, neck and prepuce becomes very œdematous and covered with broken bullæ with profuse discharge. Calamine and Lead Lotion was successful in relieving the intense irritation. The patient, a gardener, had not always been susceptible as he had pruned the tree often before without being poisoned.—B.M.J. ii./10,545. *See* also B.M.J. ii./16,480.

Observations on the pollen of Poison Sumach. Rhus poisoning is not wind borne.—Am. Jl. Ph., Dec., 1913.

Lead Acetate dissolved in Alcohol gives speedy and permanent relief.

Tincture of Sanguinaria Canadensis dabbed on with a soft cloth, is a remedy for the irritation.—P.J. ii./11,832.

Rosæ Gallicæ Petala (*Off.*), U.S. The fresh and dried unexpanded petals. **Confectio Rosæ Gallicæ** and **Infusum Rosæ Acidum** and Syrup Rosæ (form of latter altered) are *Off.* Infuse 15 minutes. **Fluidextractum Rosæ**, U.S., 1 = 1 Glycero-hydro-alcoholic.

Mel Rosatum P. Jap. Macerate Rose Petals 1 in dilute Alcohol 5, 24 hours with shaking, press and mix with the liquor Honey 9, Glycerin 1, and evaporate to 10.

Rubia Tinctorum (*Rubiaceæ*), Dyer's Madder. The root of this plant is known in Germany as **Krapp-wurzel.** A native of Southern Europe and the Levant—cultivated in Holland, etc. A dye stuff yielding Alizarine, Xanthopurpurine, etc., not to be confused with the Indian Mudar (Calotropis) *q.v.* It has been used (U.S.D.) in amenorrhœa and rachitis.

Rubus Chamæmorus (*Rosaceæ*).—Cloudberry, Norwegian blackberry, marsh or dwarf raspberry. Also grown in Newfoundland. Known in Russia as Moroshka and in Germany as Torfbeere, Maltebeer, Woollenbeere, and Zwerg Maubeere.—P.J. ii./07,639. The leaves of this are diuretic, useful in nephritis, cirrhosis of liver and cardiac affections. Infusion, 1 in 12. *Dose.*—½ ounce; fluid extract, *dose*, ½ to 1 drachm. Fruit is antiscorbutic and used for hæmoptysis, will also abate fever.

Rubus villosus, a species of Blackberry; was Official in U.S. *R. Idæus* = **Raspberry.**

Rumex obtusifolius — the dock. — Dried root was found to contain 0·447% of iron in a combination analogous to the ferrid derivatives of the nucleones.

✱**Fer Ascoli** (T.M. 315389) TABLETS.—A preparation with nucleins as base: contains 3% of iron. Valuable in treatment of anæmic girls.—L. ii./09,332.

Rumex Crispus.—Yellow Dock (*Polygonaceæ*). The root contains Emodine Chrysophanic Acid and Rumicin,—the last (*Syn.* Rumin) *Dose.*—1 to 4 grains in scrofulous affections, dyspepsia, astringent and tonic. Tincture 1 in 10, Alcohol 50%. *Dose.*—1 to 10 minims. **Unguentum Rumicis.**—Fresh Yellow Dock Root 1, Benzoated Lard 2, warmed two hours and strained. Used like Chrysarobin applications.

Ruta Graveolens—(*Rutaceæ*). *Dose.*—10 to 30 grains. Contains about ½% Volatile Oil Sp. Gr. 0·880 (consisting of Methyl Nonyl-Ketone $CH_3CO.C_9H_{19}$ and Methyl-heptyl Ketone). *Dose.*—2 to 5 minims. In amenorrhœa and menorrhagia. Large doses have been given to procure abortion.

Confectio Rutæ. *Dose.*—1 to 2 dr. Fresh Rue, Caraway, Bay Berries of each 1½, Sagapenum ½, Black Pepper ¼, Honey 16. Add the first three in powder by degrees to the Sagapenum melted in the Honey with water *q.s.* Carminative and antispasmodic. Sometimes used as enema in infantile convulsions.—Pereira. **St. G. H** has Rue 6, Caraway 6, Bay Berries 6, Black Pepper 1, Asafœtida 2, Honey 64, Water *q.s.* 180 grains of this with 20 ounces of Chamomile Infusion to prepare *Enema Rutæ.*—St. G. H.

P1 Sabina, U.S. VIII. *Average dose.*—7½grains. FR. CX. has this as max. single dose. Max. during 24 hours 15 grains. Tops of *Juniperus Sabina* (*Savin*), Linné (*Coniferæ*). **P1 Oleum Sabinæ.** *Dose.*—1 minim. Has emmenagogue and abortifacient properties. The oil from *J. phœnica* is an inferior substitute medicinally.—Umney, C.D. ii./09,580; P.J. ii./08,624.

P1 Unguentum Sabinæ, B.P. '85. Melt Lard 16 and Wax 3 on a water bath, add fresh Savin tops bruised 8 and digest 20 minutes and express through calico. Freshly made is used in conjunction with blisters in rheumatoid arthritis, see Cantharides.

Sagapenum.—*Dose.*—10 to 30 grains. A gum-resin, rarely met with: is in yellowish-red pieces. Has a taste somewhat resembling asafœtida, and properties similar to this and galbanum, for use in amenorrhœa and hysteria.

Salep.—Tubera Salep, P.G.V., Ph. Ned. Dried tubers of various species of Ophydinæ—Orchis mascula and others. (N.O. *Orchidaceæ*). When fresh have bitter taste. They are immersed in boiling water on collection and dried; contain mucilage and have nutritious and demulcent properties; allay gastro-intestinal irritation. Mucilago Salep 1%, P.G.V. Freshly made. Salep is much sold in the Indian Bazaars as an article of diet.

Salix nigra.—The bark of this, the black or pussy willow, is used as a sexual sedative, tonic and astringent, and given for gonorrhœa and spermatorrhœa. Liquid extract, 1 in 1. *Dose.*—¼ to 1 drachm. *Flavoring.*—Syl Lavandulæ, Syl Sassafras (full doses); Syrupus Aurantii, Syrupus Rosæ. Solid Extract. *Dose.*—1 to 5 grains. Relieves ovarian pain and nocturnal emissions.

Salvia. Sage (*Labiatæ*). *Dose.*—15 to 30 grains. Dried leaves, aromatic, astringent, tonic.

Sambuci Flores (*Sambucus nigra*—*Caprifoliaceæ*), Elderberry flowers (B.P '98). Infusion and pomade are used as domestic remedies for sores, bruises, etc. **Aqua Sambuci** (P.B. '98) is prepared from the fresh flowers (or flowers preserved with common salt), a frequent ingredient in lotions for the eyes and skin.

Sanguinaria Canadensis, U.S. (*Papaveraceæ*). 'Blood Root.' Expectorant, emetic, tonic, for cough. *Average dose.*—2 grains. Ⓟ Liquid extract 1=1. *Average dose.*—1½ minims. Ⓟ Tincture U.S. *Average dose.*—15 minims. Sanguinaria Root 5, Acetic Acid 1, Alcohol 30, Water 50, by hydro-alcoholic macero-percolation; contains alkaloid. **P1** Sanguinarine $C_{20}H_{15}NO_4H_2O$, (Schmidt) = 351·246 and several others, also a resinoid extractive Sanguinarin. *Dose.*—½ to 1 grain.

Assay, employing Ether-Benzol for extraction and Citric Acid as solvent. The commercial drug assays 3 to 4% total Alkaloids.—Am. Jl. Ph., Sept., 1913.

Sansiviera. The rhizome of *Sansiviera thyrsiflora*, a native of certain parts in South Africa. We examined the root some years ago and found it to contain no alkaloid.

The root possesses laxative properties, it is free from griping action, and pleasant to take. The Kaffirs chew a stick of the fresh root at a time, and swallow the juice for use as an anthelmintic, and more particularly for the treatment of hæmorrhoids.—for the latter it is known to be efficacious. Should be given in bold doses, as the active constituents only exist in small proportion. **Liquid Extract.** *Dose.*—2 to 4 drachms. Prepared as Liquid Extract of Liquorice. As a laxative. **Solid Extract.** *Dose.*—10 to 20 grains for pills and capsules. *c.f.*—Oliver, C.D. i./09,21.

Saponins are toxic glucosides contained in Sarsaparilla and Quillaia, etc.

The word "Saponin" is a collective one implying a group of Nitrogen-free glucosides:—information as to the plant of origin ought to be given. Death from Saponins is preceded by a long incubation period with the symptoms of central paralysis. Fish die when the water they are in contains 1 in 100,000. Saponin in Salt and Carbolic Acid baths is said to aid the action of all drugs which stimulate the skin. The nasal mucous membrane is stimulated and produces copious skin secretion by the action of dilute spray, gargle or irrigation. Saponins are anthelmintic and diuretic. Suggested that Sarsaparilla be standardised by its content of Saponins.—P.J. i./11,244,293.

The addition of Saponin to insecticidal emulsions is advantageous.—Na.

Sassafras Radix (B.P. 1898). *S. officinale*, or *S. variifolium* (*Lauraceæ*), U.S. The oil (*Oleum Sassafras*, U.S.), containing Safrol, destroys the vitality of pediculi; it should be applied with a stiff brush, but not touch the skin; yet, if so, a little bland oil allays the irritation it causes. **Safrol,** $[C_6H_3C_3H_5(OOCH_2)\ 1:3:4] = 162{\cdot}13$. Obtained from sassafras oil, camphor oil, and other volatile oils, is used for scenting cheap soaps, also in manufacture of heliotropin, and as an anodyne liniment in subacute rheumatism. Colourless liquid. Optically inactive. Soluble in an equal volume of strong alcohol and in 30 of 70% alcohol. *Dose.*—20 to 30 minims.

The Sp. Gr. of the oil is usually 1·068 to 1·086. O.R. + 1° to + 3°—P.J. ii./08,624.

It is used for all lice and nits in pediculosis.

In treating ringworm, the hair is cut close round to identify the patches, and the oil applied twice a day by a brush. This is continued for a few weeks if necessary. Non-irritating and pleasant to use, prevents spread of the infection, and destroys the fungus.

Dispensing Note.—To produce an emulsion in water a mixture of Acacia and Tragacanth Mucilage is best. Rub the oil down with the Mucilage of Acacia, *e.g.*, 3 drachms, for a 6 ounce mixture, then add gradually 1 ounce of Tragacanth Mucilage. The acacia divides the oil into particles and the tragacanth suspends them.—C.D.

The oil in capsule form (3 minims) may have the power of reducing body weight.

Oliveri Cortex (*Off.*). OLIVER'S BARK OR BLACK SASSAFRAS BARK. Dried bark of *Cinnamomum Oliveri.* (*Lauraceæ*). Aromatic, yields an oil resembling Sassafras Oil.—P.J. 11,99,165.

Tinctura (*Off.*). *Dose.*—½ to 1 drachm 1 in 10 alcohol 60%.

Saw Palmetto.—A palm growing in America. Possesses sedative, tonic and diuretic properties. Is largely used in urethritis, gonorrhœa, dysmenorrhœa, impotence, cystitis. A liquid extract 1 = 1. *Dose.*—½ to 2 drachms.

Flavoring.—Glyl Lavandulæ (full dose); Spiritus Myristicæ, Syrupus Aurantii. A solid extract is also prepared. *Dose.*—3 to 5 grs. in pill or tablet. Is also frequently combined with Santal in a miscible form.—'Sanmetto.' **Sabal,** U.S., is the partially dried ripe fruit.

Scilla (*Off.*). *Dose.*—1 to 3 grains. The bulb of *Urginea Scilla* (*Liliaceæ*) (*U. maritima*, U.S.), with membranous outer scales removed, cut into slices and dried. Resembles Digitalis in action. It is also expectorant and more diuretic. *Off.* are: **Acetum Scillæ,** 1 in 4 of approx. dilute Acetic Acid. *Dose,* 5 to 15 minims. **Pilula Scillæ Composita** and **Tincture,** *Off.* 1 in 5 of 60% alcohol. Might be made with 45% alcohol.—P.J. ii./09,142.

Flavoring.—Void of much taste. Use, *e.g.*, Syl Coriandri, Syl Anisi; Syrupus Tolutanus. In U.S. IX., are **Acetum** 1 in 10; **Fluidextract,** 1 = 1 Alcoholic (was Acetic) *average dose,* 1½ minims. **Syrup** = Vinegar of Squills 45, Sugar 80, Water to 100; Ⓟ **Syrupus Scillæ Compositus,** *average dose* 30 minims = Fluidextract of Squill and of Senega each 80, Antimony Potassium Tartrate 2, Syrupus *q.s.* to 1,000. **Tincture,** U.S. 1 in 10.

Squill Preparations U.S. IX. are now biologically standardised. *c.f.* Digitalis, *Vol. II.*

Poudre de Scille.—FR. CX. Max. dose during 24 hours 15 grains. FR CX. has **Extract** (Alcoholic), with max. doses provided also **Tincture** 1 to 5 Alcohol 60%, max. single dose 25 minims, max. during 24 hours 85 minims approximately.

Normal Tincture (Physiologically) of **Squill** may be of such a strength that the minimum lethal dose per 100 Gm. of frog is 20 minims, such dose proving fatal within 4 hours. *See also Vol. II.*

As a heart tonic it is not satisfactory used by itself. It seems to spend its force on the auricles, leaving the ventricles hardly affected at all. Its glucosides are failures.—G. Sharp, P.J. i./16,347.

Squill as diuretic *c.f.* action of Digitalis, p. 385.

Scopola Carniolica (*Scopolina atropoides*).—The root of this, an Austrian plant has been imported as a substitute for belladonna, and was in U.S., 1900, with not less than 0·5% alkaloids, assayed as belladonna leaves. Scopola root contains two bases—(a) scopolamine, optically active which is identical with hyoscine, and (b) scopolamine, which is optically inactive, and which is identical with Hesse's atroscine—Naylor Presidential Address, B.P.C., P.J. i./05,123. Scopola *per os* is said to cause less dryness of the throat than belladonna, and is probably more nearly allied to hyoscyamus in its action.

Scopola Japonica is stated to contain about 0·18% alkaloids consisting of about 90% Hyoscyamine with about 5% Scopolamine, and a minute quantity of Atropine.—M. Watanabe, Int. Conl., 1909.

Scutellaria. *Dose*, 5 to 15 grains. Dried herb of *Scutellaria lateriflora*, Linné (N.O. *Labiatæ*). Used in the form of dry, greenish-brown powdered extract (scutellarin). *Dose*, 1 to 5 grains. For epilepsy, insomnia, and hiccough. **Liquid Extract** 1=1. *Dose*, 5 to 15 minims.

In epilepsy a simple infusion or extract appears to stimulate the kidneys and increases output of urea and uric acid. In chorea effects even more marked. —W. Bramwell, B.M.J. ii./15,880.

Sempervivum tectorum, Common Houseleek.

According to N.S.D. the bruised recent leaves are employed as cooling applications to burns and other external inflammations. **Succus** (preserved with 20% Alcohol) is said to cure warts.

Inoperable mammary carcinoma has been treated with good result by injections of sterilised **Succus** prepared as follows:—The expressed juice of the fresh herb is allowed to stand two hours, strained from flocculent deposit and evaporated on a water bath to half its bulk. It is then cooled, filtered and sterilised. 5 to 15 minims of unconcentrated juice were first used, subsequently passing on to the concentrated preparation. An ointment of the juice was also used and the drug was taken internally. Injections were given twice a week for twelve months with relief of pain, diminution of growth, increase of weight.

Its use was suggested by noting its effect on warts. The juice rubbed on the surface of a wart several times daily for two or three weeks will almost invariably remove the growth —Bouverie, F. P. McDonald, L. i./13,128.

Senecio.—Ragwort. *Senecio Jacobœa* and *S. aureus* (*Compositæ*) are emmenagogues, and have been employed in amenorrhœa and dysmenorrhœa especially when depending on chill. Liquid Extract, 1=1 of herb. *Dose*, 20 to 60 minims. Tincture, 1 in 10 of proof spirit. *Dose*.—1 to 2 drachms *Senecin* is a dry extractive. Two alkaloids, ⓟSenecionine, $C_{16}H_{25}NO_6$ (?) =327·29 and ⓟSenecine are contained. Excellent in gastralgia and dyspepsia.—P.J. ii./04,967.

Senecio latifolius.—Closely related to the common groundsel. This and various other species have been shown to induce fatal poisoning in cattle and horses—hepatic cirrhosis—in South Africa, Canada, and New Zealand

Two new alkaloids isolated.—ⓟSenecifoline $C_{18}H_{27}O_8N$=382·45 M.pt. 194° C. and ⓟSenecifolidine $C_{18}H_{25}O_7N$=385·316 M.pt. 212°. The former has been reported on by Cushny as being poisonous to animals.

The plant is thought to be responsible for 'Molteno disease' in cattle in S. Africa.—P.J. ii./12,579.

Senega (*Off.*), U.S. Dried root of *Polygala senega* (*Polygalaceœ*). An expectorant, contains Senegin. **Infusion** 1 in 20, Concentrated Solution 1 in 2 (B.P. '98). **Fluidextract**, U.S., 1=1. *Dose*.—15 minims. The alkali contained forms soluble compounds with the pectin principles in the root thus preventing gelatinisation (Caspari). **Syrup**, U.S.—Fluidextract 1, Simple Syrup to 5. The concentrated infusion of commerce is apt to deposit, owing to action of enyzmes; less likely to if made with a little alkali. **Polygalæ Radix, P. Belg.**, is the same. Fluidextract P. Belg. yields 25% solid matter. **Tincture** (*Off.* and B.P. '98) 1 in 5 Alcohol 60%.

Infusum Polygalæ Compositum. *Dose.*—½ to 1 ounce. Senega 10, boiling water 165, potassium iodide 5, paregoric 20, lobelia tincture 10. In use on the Continent.

Tisane de Polygàla (Root)—(Fr. Cx.), 1 in 100 boiling water; infuse ½ hour. Description of constituents.—Naylor, P.J., July 28/06.

Serpentariæ Rhizoma (*Off.*), U.S. *Average dose.*—15 grains (**1·0 Gm.**). Dried rhizome and roots of *Aristolochia Serpentaria* (*Virginia Serpentary*) or of *A. reticulata* (Texas *Serpentary*) (*Aristolochiaceæ*). Bitter tonic. Infusion (B.P. '98), 1 in 20, Concentrated Solution 1 in 2 (B.P. '98), Tincture (*Off.*), 1 in 5, now 60% Alcohol, was 70%. **Liquid Extract**, 1=1 Hydro-alcoholic. *Dose.*—5 to 15 minims. **Tincture**, U.S., 1 in 5 of Alcohol and Water in proportion of 65 and 35.

Shellac.—A resinous substance formed by a scale insect, *Tachardia Lacca* (fam. *Coccidæ*, ord. *Hemiptera*), which lives on a large number of trees, *e.g.*, *Butea frondosa*, *Ficus religiosa*, *Schleichera trijuga*, *Shorea robusta* (Wild Lac) The plants specially cultivated for Lac are *Acacia arabica* and *Cajanus indicus.* The red dye or lake washed out in the process of manufacture is now no longer a commercial article. A small proportion of common resin and powdered orpiment, and necessary colours for decorative work added.—P.J. ii./05,646. Treatise on chemistry of shellac.—P.J. ii./05,653.

For commercial analysis of, see Allen, 1911, Vol. IV., p. 69.

Simaruba officinalis (*Simarubaceæ*).—*Syn.* MOUNTAIN DAMSON. *Dose.* —15 to 30 grains. Infusion 15 grains to 1 ounce in boiling water (infuse 15 minutes). *Dose.*—1 ounce. Has bitter taste, is astringent, and useful in dysentery. Contains (*a*) a colourless crystalline bitter glucoside $C_{22}H_{30}O_9$ (*b*) a colourless crystalline bitter principle, (*c*) yellow resin, (*d*) grown resin.—C.D. i./08,600. **Decoctum Simarubæ et Punicæ Granati.**—Add Simaruba Bark, Pomegranate fruit rind and Gum Arabic of each 15 Gm. to a litre of water and boil down to ½ litre. *Dose.*—30 Cc. three or four times daily Cures dysentery rapidly. (Egypt).—Ph. Notes.

For *E. Histolytica* carriers.—*Dose* of ½ to 2 handfuls of pieces of the bark cut into ¼ inch lengths given in 1 pint drinks gave some success.—S. Shepheard and D. G. Lillie, L. i./18,501.

Simulo.—Fruit of *Capparis coriacea,* from Peru. Its powder, 45 grammes in 500 grammes of sweet wine, of which a wineglassfull was taken every night and morning cured a case (Dr. Larrea, who narrates it) of epilepsy after he had 14 fits. preceded by a distinct aura. Used in nervous diseases, hysteria, and epilepsy.

Solanum Carolinense.—Horse-nettle. A native of Southern U.S. A liquid extract 1 = 1 is employed in epilepsy. *Dose,* 15 to 60 minims.—H.

Solanum Dulcamara (*Caules Dulcamaræ*, P. Austr.) (*Solanaceæ*).—Woody Nightshade. Bittersweet. The dried herb is employed. Sedative analgesic. Ⓟ**Extractum Dulcamaræ**, P. Austr.—An aqueous extract inspissated and mixed with equal amount of acacia, and powdered. *Berries* contain 0·15 Solanine.

Description of and of its poisonous characters also of *S. Nigrum.*—E. M. Holmes, P.J. ii./15,524.

Solanine. *Dose.*—⅙ to ½ grain several times daily. This substance (contained in this and in potatoe shoots) is both alkaloidal and glucosidal in character. It has been used in neuralgia and as an analgesic generally. In painful gastric affections, spasmodic asthma and in epilepsy. The Hydrochloride has been given hypodermically. 1 Gm. is said to be necessary to kill a rabbit. It is easily decomposed.

Solanum Nigrum.—Black or garden Night-shade. The leaves are said to be eaten boiled in the Isles of France and Bourbon and Hawaii Islands.

The Wonderberry stated to be from a luxuriant form or hybrid of Solanum Nigrum and to be edible. The berries of S. Nigrum contain 0·3% of *Solanine*—*vide above.* Tomatoes also contain this alkaloid. For those desirous of eating the berries (which should be *cooked*) use the cultivated wonderberry only. In China, India, and Brazil, the plant is taken as a diuretic for skin diseases and the juice for the enlargement of the liver —P.J. ii./09,422.

Solanum Sodomæum.—The fruit of this plant is the apple of Sodom—when ripe is a pale yellow berry averaging 1 inch in diameter. Employed for destroying parasites in S.A., also for itch, ringworm, etc.—Juice of the fruit is extremely acid and bitter—it also contains Solanine.—Oliver, C.D. ii./05,374; ii./08,325.

Solanum Tuberosum. Extractum Solani Liquidum.—The concentrated juice of the potato preserved with glycerin has been used in synovitis, gout, lumbago, and rheumatism—as also Liniment, plaster and Ampoules.—L. i./14,1035 ; C.D i./14,600.

Sorbus Aucuparia.—The Mountain Ash. A liquid extract is prepared, 1=1. *Dose.*—10 to 30 minims. A useful mild aperient ; also has diuretic and emetic properties.

Sorghum. Chinese Sugar Cane. *Andropogon arundinaccus* (*Gramineæ*). Indigenous in China and India and cultivated in U.S. Proprietary preparations such as 'Lithiated Sorghum Comp.,' are popular in America in bladder affections.

Soya Bean.—*Glycine Hispida* (*Leguminosæ*). This bean is extensively cultivated in China and Japan for human consumption and latterly in America and Europe, chiefly as a forage crop, is eaten as a vegetable, in soups, sometimes pickled green, boiled and served cold with a sprinkling of Soy Sauce, and sometimes as a salad. A favourite method of preparing in the East is to boil until soft and place the resulting mass in a warm cellar until it ferments,—the resulting 'cheese' being known as 'Natto.'

Analysis of the bean calculated on water free basis, indicated 38·5% Protein and 20% fat. It is probably due to this large amount of easily assimilable Nitrogenous matter that the Chinese and other rice eating people require so little meat. It contains practically no Starch—the latter fact is said to be due to presence of a diastase in the bean capable of converting Starch formed, two-thirds into Sugar, one-third into Dextrin. Has been used as an addition to ordinary diabetic dietary,—the beans may easily replace the Gluten of bread,—causes reduction in percentage of sugar.—L. ii./10,1844. **Soy Flour** is even more serviceable, containing almost ⅓ more Protein than the bean, this being due to the removal of the fibrous hulls, which contain but little Protein.—B.M.J.E. i./11,80.

The protein of the Bean is being extensively used in connection with the treatment of diabetes and malnutrition. Soya Bean Meal from which it is made must be carefully examined for the toxic *Java Bean.*—F. W. Crossley Holland, P.J. ii./12,154. Soya Beans average 8 m.m. in length and 7 m.m. in breadth and 6 m.m. in thickness. They are roundly ovoid in shape and about 99% are pale yellow in colour—there being a few darker coloured, smaller and more elongated. Structure of the bean. Soya Bean Cake and Meal is enormously adulterated.—T. E. Wallis, C.D. ii./13,278 ; P.J. ii./13,120.

E. S. Peck states *Glycine Hispida* has been used in clinical experiments for the splitting up of Urea into Ammonium Carbonate.

Synthetic Milk *q.v.* has been made from the bean.

✱**Sarton** (T.M. 322562) is a preparation of the bean for use as a diabetic food.

Soya Oil has Iodine value 121 to 123. Cowie found 131—C.D. i./10,66. For further characters see P.J. ii./11,407. *c.f* p. 568, 597.

Spigelia U.S. *Sp. Marilandica* (*Loganiaceæ*), Indian Pink-root. *Average dose.*—60 grains. **Fluidextract**, U.S., 1=1 diluted Alcohol. *Average dose,* 1 drachm. Is employed for round and tapeworm, but is very potent. Pink-root and its substitutes, History.—Am. Jl. Ph., Oct. 1910,466.

Stannum, Sn=118·7 Tin.

The metal in finely powdered—preferably precipitated form. Given internally pure tin powder is probably not absorbed.

The metal in filings or powder was formerly used as a tæniacide, the destruction of the worm being due to the mechanical action of the foreign substance. From 4 to 15 Gm. were given suspended in syrups or made into an electuary and followed in from 3 to 6 hours by a brisk cathartic. Some of the salts (chiefly Chloride) are credited with vermicidal properties. In dose of 1/16 to ½ grain (**0·004 to 0·03 Gm.**) the chloride has been used as an antispasmodic in chorea epilepsy and other convulsive diseases.—N.S.D.

✱**Stannoxyl** (T.M. 379084) **Tablets.** Contain metal tin and oxide of tin. *Dose.*—Four to eight, children two to four per diem at any hour in the day either in water or eaten dry. 2 Cc. ampoules for intramuscular injection, also Liquid for internal use are made.

Uses.—In staphylococcus infections—boils, carbuncles, furunculosis acne, styes. Effect stated to be remarkable ; "cures" effected by the 5th or 6th day. Stated to be harmless and specific. Has also been suggested for use in anthrax.

It has been found that tin workers never suffer from boils. Powdered tin is a popular remedy for this complaint. In France Gregorie & Frouin tried doses of from 0·5 to 1 Gm. of powdered tin or oxide of tin in 50 cases with cures in 5 to 14 days. Hudelo employed a mixture of 0·25 Gm. each pure tin and oxide of tin in cachet with success.—Jl. des Practiciens, June 2/17, *see* also Pr., Aug. 17.

Staphylococcal infections treated. Intraveonus injection of chloride or hydroxide of tin in the rabbit 12 hours after intraperitoneal inoculation of virulent staphylococci retarded the death of the animal by several days. Furunculosis and acne well treated by tablets.—L. i./18,99.

Staphisagriæ Semina. *Off.* U.S. *Average dose* (U.S.).—1 grain.

The seeds of *Delphinium Staphisagria, Larkspur* (*Ranunculaceæ*) contain about 30% of oil and the white crystalline alkaloid. P1 **Delphina.** *Syn.*—**Delphinine.** $C_{22}H_{35}NO_6=409·40$. *Dose.*—$\frac{1}{64}$ grain increased to $\frac{3}{4}$ grain. Soluble in water, alcohol, and ether. This acts chiefly on the nervous system, first upon the bulb, next on the sympathetic. Said to be preferable to Aconitine, being less toxic. It acts on the heart, accelerating the cardiac movements, until finally arrest occurs in diastole.—L. ii./18,96. Given internally in toothache, neuralgia, earache, rheumatism, dropsy, and spasmodic asthma. Locally an alcoholic solution or ointment, containing 2 to 8%, causes tingling and transient redness like veratrine. ⓅOne part of the Oil expressed from the seeds to 6 or 12 of perfumed olive or almond oil effectually kills pediculi of all kinds. Remove nits with a mixture of vinegar and proof spirit. Ⓟ**Unguentum** (*Off.* and B.P. '98). For scabies and to kill lice. **B.S.H.** has Expressed Oil 60 minims, Lard 1 ounce.

Ⓟ**Fluidextract U.S.** 1=1 Hydro-alcoholic. *Average dose.*—1 minim.

Stillingia Sylvatica U.S. (*Euphorbiaceæ*), Queen's Root.

Dose.—Average 30 grains. Contains Volatile Oil and Alkaloid (?). Large doses emetic, cathartic; small doses alterative. Is employed in scrofula, syphilis, jaundice, and for piles. **Fluidextract U.S.** 1 = 1. *Dose.*—30 minims. **Liquor Stillingiæ Compositus** is McDade's Succus Alterans for syphilis. *Dose.*—1 drachm.

Styrax Preparatus (*Off.* and B.P. '98). U.S. Thick brownish liquid compound obtained from *Liquidambar orientalis* (*Hamamelidaceæ*). Contains Cinnamyl Cinnamate (Styracin) and other Cinnamic Acid Compounds, together with a large proportion of Storesin, $C_{36}H_{55}(OH)_3 = 538·644$. *Off.* requires 20% Cinnamic Acid. Ointments of 20% are used in parasitic skin affections.

Storax of late years has been impoverished. A concentrated Essence of Storax (stated to be 50 times as strong as natural Storax and representing the true odor of Storax) is said to be prepared from the crude drug before placing on the market. Cinnamic Alcohol is also abstracted and used as a perfume for Soaps, etc.,—the natural Alcohol being far more fragrant than the Artificial, which is, of course, cheaper.—P.J. ii./11,6. Composition and analysis, see Allen, 1910, Vol. III., p. 462.

Phenyl-propyl Alcohol. *Syn.* Hydrocinnamyl Alcohol occurs in Storax as a Cinnamic Acid ester. It is a thick colourless oil (Sp. Gr. 1·007) with odour resembling Cinnamic Alcohol and hyacinths. It is used in hyacinth, narcissus, jonquil, and like perfumes.—P.R., July 5th, 1914, p. 189.

Source. Since the war has been almost unobtainable. It came almost entirely from Turkey. The country would not suffer very much if it never imported any again.—F. Ransom, C.D., Mar. 10/17.

Phenyl propyl acetate, allied to Styracin, is a synthetic substance used in manufacture of Synthetic perfumes and fruit essences.

Succinum.—Amber obtained from a fossil resin found in Germany. Oleum Succini. *Dose.*—1 to 5 minims. Useful in persistent hiccough, asthma, whooping cough and hysteria. Diluted with Olive Oil is rubbed upon rheumatic parts and upon the chest for bronchitis and pertussis.

As local application in rheumatic affections useful.—Pr., Nov., 16/640.

B.P.C. has Amber Oil 1, Clove Oil 1, Olive Oil 2, as **Linimentum Succini Compositum.**

Genuine Oleum Succini Rectificatum has Sp. Gr. 0·950 approximately. Commercial **Oil of Amber** is almost entirely derived from the crude resin spirit obtained from colophony resin. It has Sp. Gr. 0·850 to 870. Like the genuine oil it consists chiefly of Terpines.—P.R., Jan., 1914, p. 17. See also **P.J. ii./08,624.**

Sumbul Radix (B.P., 1898). Transverse slices of the root of *Ferula Sumbu* (*Umbelliferæ*), but this is not collected now. Nervine sedative and antihysteric. Contains aromatic volatile oil, and resin. Supplies have been greatly hindered by the war. Tincture. 1 in 10. *Dose*, 30 to 60 minims. Extract Sumbul average yield is 15% (Caspari). **Fluidextract**, U.S., 1=1 hydro-alcoholic. *Average dose*, 30 minims.

Symphytum officinale (*N.O. Boraginaceæ*).—The Common Comfrey plant with root boiled as a poultice has been used for cancerous tumours, also for hæmoptysis and kidney disease with blood in the urine, as a decoction or syrup. Root pulped was used to stiffen bandages for fractures.

According to investigation of C. J. Macalister and colleagues this plant, which has been used from Saxon days as a ' vulnerary herbal,' contains **Allantoin**. Titherley and Coppin found 0·6 to 0·8 % in the air dried material. See also A. Vogl, Y.B.P., 1919,165.

A strong (mucilaginous) **Infusion** of the root. *Syn.* **Mucilago Symphyti.** *Dose.*—1 to 2 ounces Comfrey Root in coarse powder 1, Boiling Water 20—infuse 20 minutes, strain, cool, and add Chloroform 1 in 500 applied to an ulcer measuring 3 by 4 inches involving the skin and deeper structures over the upper thorax, for about a week, cleaned it and produced a distinct growth of epithelium from the margins.

Concentrated Infusion.—*Dose.*—2 to 4 drachms. Suitable for dilution 1 with 3 of water. **Liquid Extract.** *Dose.*—2 to 4 drachms 1 in 4 by extracting the drug in coarse powder with water, and preserving with 20% of 90% alcohol. **Dry Extract.** *Dose.*—5 to 10 grains is prepared by extracting the drug with water at about 65° C. and evaporating and powdering. **Elixir Symphyti.** *Dose.*—½ to 2 drachms diluted is also made for internal use, *e.g.*, for the treatment of hæmoptysis.

The Liquid Extract (*Aqueous* extraction would appear to be best) from the root applied on lint to saturation has been found useful to cure old ulcers which resisted other treatment. The nightly application of the Infusion was found to be the only remedy for pruritus ani in a case where sleep was prevented for weeks together.

Internal use of the **Infusion** satisfactory in gastralgia,—eases pain of gastric ulcer,—indeed the internal use is more wonderful than its effect in external application,—promotes the growth of new mucous tissue.—W. Bramwell, B.M.J. i./12,12.

A decoction of Comfrey (or Infusion) is an old remedy for bad coughs and weak chests. It is very soothing.—B.M.J. i./15,748. Scraped and pulped up the root is considered soothing to sore and broken parts of the body—B.M.J. i./12,102. This plant and *S. tuberosum* have both the same properties, resembling the COMMON BORAGE, BORAGO OFFICINALIS, *c.f.* Tisanes, in many respects, both yielding Allantoin-containing infusions.—B.M.J. i./12,336, (Historical Notes—Prosper H. Marsden). *Ibid.*, p. 344, 393.

Allantoin.—$C_4H_6N_4O_3$ = 158·108. *Dose* of Saturated Solution (0·3 to 0·4%) ½ to 1 ounce three or four times daily. *Soluble* in water 1 in 260, in alcohol 90% 1 in 2,360, in alcohol 80% 1 in 1,700, in absolute alcohol 1 in 5,000 (all by experiment). This substance is obtainable in brilliant crystals with indefinite melting point, *i.e.*, decomposes. *Manufacture.*—May be prepared artificially by oxidation of Uric Acid in Alkaline Solution in the cold.

Allantoin is deemed a cell proliferant and is used locally as the Saturated Solution (*v.* above). It is an interesting fact that Allantoin is present both in animals and in plants, *e.g.*, in the fetal allantoic fluid (hence the name), also in the urine of pregnant women, and in small amounts in normal urine. It may be derived in the latter from vegetable foods,—in the healthy individual it appears to come from these. It may pass practically unchanged through the human being. It is present in bread, French beans and green peas. Although the Allantoin in the human embryo may be a fœtal waste product, in the economics of nature it may have a function to perform regarding cell multiplication, especially as it is not at once eliminated from the maternal circulation,—it occurs in milk,—the food of the rapidly growing young organism. Presence of Allantoin in wheat germ has been confirmed by Power.—P.J. ii./13,117.

Allantoin Dressing (Saturated Solution above) has been found useful in chronic varicose ulcers, boils, etc., and may prove of use as a cell proliferant when skin grafting has been performed.—B.M.J. i./12,10.

The Dressing is applied on absorbent lint or a few folds of gauze and covered with gutta percha tissue—it should be renewed frequently during the day.

Allantoin used to burns. It not only stimulates epithelial growth but 'cleans up' sloughing surfaces in a remarkable manner.—B.M.J. i./12,102.

Allantoin is not a poisonous antiseptic. It favours rather than inhibits the growth of organisms—demonstrated by experiments on simple forms of life from sea water. Further *B. Coli*, *Staphylococci*, *Streptococci* and *Tubercle Bacilli* are not affected by presence of 0·2% in the culture medium. In Comfrey rhizome it is abundant in the spring but almost absent in the summer (June).

Allantoin (15 minims of 0·4% solution) injected into hyacinth bulbs in process of growth causes them to flower more rapidly. Experiments on other plants proved that Allantoin can be used by vegetable cells in connection with their proliferation—as with certain animal cells. Allantoin is a dangerous substance to give or to apply in *malignant* cases. It has in some way to do with the activities of **Nucleic Acid,** which contains four Metaphosphoric Acid radicles and Purine and Pyramidine groups. Both of these yield Uric Acid in their metabolism and Uric Acid on oxidation yields Allantoin. Cellular resistance may depend on efficient building up of Nucleic Acid.

Metaphosphoric Acid in conjunction with Allantoin has been tried in tubercular sinuses and skin affections internally and hypodermically with promising result.—C. J. Macalister, B.M.J. ii./12,702.

Allantoin 0·5% Alcoholic Solutions applied daily to wounds—improved time of epidermization.—B.M.J. ii./13,731.

Allantoin Ointment 0·3% in Vaseline suggested for use for bedsores.—W. H. M.

Tamarindus Indica (*Leguminosæ*). *Dose.*—1 to 8 drachms. The preserved fruit contains Tartaric Acid and Potassium Acid Tartrate in considerable quantity, and added sugar about 30%. It is also imported pressed into a solid mass as pulp.

Pastilli Tamarindorum Compositi. P. Aus. Add. VIII. **'Hindu Dates.'**—Tamarind Pulp 10, Senna in fine powder 3, Sugar 5, Wheat Starch 1. Mix on water bath. Divide into Pastilles weighing about 40 grains each and cover with chocolate. Useful laxatives for children and invalids.

Tamus Communis. (*Dioscoriaceæ*). Black Byrony (found chiefly in Mediterranean region). **Tincture** of this, applied with brush, has been found useful in chilblains (unbroken), in conjunction with Calcium Lactate internally. The berries are said to be an irritant poison. Description of.—E. M. Holmes, P.J. ii./15,358.

Tanacetum, Tansy.—Leaves and tops of *Tanacetum vulgare.* An aromatic bitter used as a vermifuge, but may cause dangerous irritation. **Liquid Extract,** 1=1. *Dose.*—15 to 30 minims.

Tantalum. Ta=181·5.

This element is usually classed chemically in a group with Vanadium (*q.v.*) and Niobium Nb=93·5 as the Vanadium group. In some respects they are related to the Nitrogen group. They are trivalent and pentavalent. Tantalum is an extremely hard white metal; it is also malleable, ductile and elastic. It is unaffected by alkaline solutions or any acid except hydrofluoric. It is used in making electric light filaments, also for certain dental and surgical instruments. It can replace platinum for chemical processes which do not require high temperatures—above 600° C. it is oxidized so cannot be used for ignitions in chemical estimations.

Tantalite Ta_2O_5 (Mn Fe) O is the only mineral worked commercially. It may contain as much as 84% Ta_2O_5 but rarely exceeds 70%. The process is secret but is probably a reduction with Sodium and fusion in vacuo.—Thorpe, Vol. 5, 1913, 399.

Taraxacum officinale (*Compositæ*) (*Off.* and B.P. '98),. *Dose,* 30 to 120 grains. Its preparations are: **Extractum** from fresh root. *Dose.*—5 to 15 grains. **Liquid extract** (B.P. '98), 1=1. *Dose.*—½ to 2 dr. *Flavoring.*—Syl Limonis, Syl Cinnamomi, Syrupus Zingiberis. **Succus,** (*Off.*) 3 of expressed juice with 1 of alcohol 90%. *Dose.*—1 to 2 dr. **Taraxacum Cocoa.** An agreeable hepatic stimulant suitable for children who are bilious. *Dose.*—One tablespoonful to be taken in the morning.

Malignant disease treated by 2 drachm doses of Liquid extract.—B.P., 1898. In one case, incurable cancer of the bladder, patient gained weight and vesical irritation reduced. Two cases of cancer of the bowel, with severe attacks of obstruction improved, resulting in normal stools with no feeling of obstruction. Abdominal pain disappeared.—H. Robson, B.M.J. i./12,1181. Relief from sickness and constipation obtained with Taraxacum (internally) in the case of a patient with a malignant tumour of the ovary and secondary deposits in the liver and omentum—the case being inoperable.—B.M.J. i./13,1256. (*q.v.* also for further refs.).

Apargia Autumnalis. The juice of, has also been tried. Its bitterness is much greater than that of Dandelion.—B.M.J. ii./12,104.

p-Hydroxyphenylacetic Acid, 3 : 4 Dihydroxycinnamic Acid, Choline and Lævulose have been found in the root. The finding of Choline was of peculiar interest in view of the fact that Taraxacum and Choline were being separately introduced at the time for use in cancer.—F. B. Power, P.J. ii./12,694.

Facts and fancies about Dandelion, and other Compositæ from the botanical aspect.—J. Small, P.J. ii./16,157.

Taxus Baccata.—The Yew. P1 Taxine, $C_{37}H_{51}NO_{10}$ = 669·603, an alkaloid, is a constituent. White crystals soluble in alcohol and ether. *Dose.*—$\frac{1}{100}$ to $\frac{1}{60}$ grain. Is said to have an action on circulation.—Proc. Chem. Soc., Vol. 18, No. 253.

The berries are poisonous. Description.—E. M. Holmes, P.J. ii./15,638,641 Poison probably obtained from Yewberries was used on arrow heads by the Greeks of old.—Sir C. Ballance, L. i./20,5.

Telfairia Pedata. (*Cucurbitaceæ*). Khomé or Quemmie Seeds. These. brownish coloured seeds contain about 50% of yellow fragrant drying oil Specific Gravity 0·928, suitable for soap making and illuminating. Telfairic Acid is the drying constituent. May have vermifuge action. From an examination which we have made we cannot trace an alkaloid in any appreciable quantity. Used by natives of East Africa as a remedy for stomach troubles and for rubbing on cuts and bruises.

Terebinthina Chia, P.L.—*Dose.*—5 to 10 grains. Oleoresin from trunk of *Pistacia Terebinthus*; was used for cancer of the female generative organs.

Teucrium Scordium (*Labiatæ*).—Water Germander. *Dose.*—10 to 20 grains. Contains a volatile oil and a bitter principle. Given for hæmorrhoids and pruritus ani. Diaphoretic; tonic for scrofula, gout, dropsy, flatulence. Liquid Extract. *Dose.* — ½ to 1 drachm. Ⓟ **Electuaire Diascordium, 'Diascordium,'** Fr. Cx. Water-Germander Herb 50, Red Rose petals 20, Bistort Root 10, Gentian 10, Tormentilla 10, Barberry Berries 10, Ginger 5, Long Pepper 5, Canella 20, Siam Benzoin 10, Galbanum 10, Gum Arabic 10, Carbonate of Iron 20, Opium Extract 5, Mellitum Rosæ—Mellité de Rose Rouge 650, Malaga Wine 100—by weight throughout. 15 grains of this Electuary contains 0·006 Gm. (about $\frac{1}{10}$ grain) of Opium Extract.

Thapsia.—The root of *Thapsia garganica*, an umbelliferous plant grown in Algeria (allied to the Silphion of the ancients); when exhausted with alcohol yields a resin which is employed in the French Codex to form a rubefacient plaster, Emplastrum Thapsiæ; Fr. Sparadrap de Thapsia, Emplatre Révulsif de Thapsia.

Thuja Occidentalis.—Arbor Vitæ. A Tincture is prepared, of the dried young tops in 10 of 70% alcohol. *Dose.*—2 to 5 minims (0·12 to 0·3 Cc). Thuja has an irritating action on the skin, and has been employed to remove warts and fungoid granulations from ulcers; internally for amenorrhœa, pulmonary catarrh, and worms. ✱**Ecthol.** *Dose.*—1 drachm well diluted. Is said to contain *Thuja occidentalis* and *Echinacea angustifolia.* Employed in all forms of septic conditions. *e.g.*, blood poisoning, typhoid, erysipelas, diphtheria, acne, etc.; also locally for any kind of pustular formation; as wound dressing, diluted with 2 to 10 times volume of boiled water.

Thymus Vulgaris (*Labiatae*). Thyme. **Extractum Thymi Liquidum, P. Helv.** *Dose.*—5 to 30 minims (**0·3 to 2 Cc.**). Moisten Thyme 100 with a mixture of Glycerin 10, Alcohol 20 and Water 20. Percolate with a mixture of Alcohol 1 and Water 3, and reserve the first 85. Percolate further, recover the alcohol, and evaporate second percolate to soft extract and dissolve in reserve so as to produce 100. *Flavoring.*—Syl or Glyl Pini, or Lavandulæ, Syrupus Aurantii. **Pertussin,** a proprietary article for whooping cough, contains this drug. *Dose.*—1 to 4 drachms repeated. **Syrupus Thymi** (Ph. Notes) Liquid Extract of Thyme 1, Syrup 7 has similar properties and dose. J. Pollard finds this preparation with a small dose of Diamorphine a virtual specific for hacking cough. The following are two useful mild sedative preparations for cough: **Linctus Thymi et Diaphorm.** *Dose.*—1 drachm as required. Diamorphine $\frac{1}{45}$ grain, Syrup of Thyme to 1 drachm. **Elixir Thymi de Diaphorm.** *Dose.*—1 drachm as required. Diamorphine $\frac{1}{45}$ grain Compound Tincture of Lavender 15 minims, Syrup of Thyme to 1 drachm.

Oleum Thymi, U.S. *Dose.*—3 minims. Distilled from the fresh herb—*c.f.* Origanum Majorana. It contains 25% Phenols (Thymol and Carvacrol). "Red" Thyme Oil on rectifying is converted into White Thyme Oil. To prevent this turning red again it is frequently distilled with a large amount of Turpentine, or indeed the white variety is simply a dilution with Turpentine. This adulteration can be detected by the fact that the Phenol content, Solubility in Alcohol and Sp. Gr. are all lowered.—*c.f.* P.J. ii./10,760.

Oil of Red Thyme is obtained from the fresh herb, Thymus Vulgaris, which is grown principally in Southern France. Spanish Thyme Oil is probably derived from a species of Origanum, but has not been definitely ascertained. Characters: Sp. Gr. 0·905 to 0·930, Phenols 20 to 45%; constituents: Thymol and Carvacrol, *l*-pinene, Borneol and Linalol.—C. T. Bennett, P.R., Nov., '13, 389.

✱**Tonga** (T.M. see 21476 and 54025).—A speciality for neuralgia. *Dose,* 1 to 2 drachms. A liquid prepared from *Epipremnum mirabile* and *Premna Taitensis.*

Tragopogon Pratense (*Compositæ*). 'Goat's Beard.'—Poisoning by seeds of, called 'Gipsy Nuts.' Emetics had been given prior to admission to hospital, but patient was still in a serious condition. Strychnine $\frac{1}{60}$ and Atropine $\frac{1}{100}$ grain given hypodermically,—the former as general stimulant, latter as antidotal, as the pupils were contracted,—but the child died with temperature 104° F. Presence of alkaloid was not proved though there was a substance which precipitated with Phospho-Molybdic Acid.—L. i./11,794.

Ulmus fulva (*Ulmaceæ*).—The SLIPPERY ELM grows in America (*Ulmus campestris* is common in Europe). The inner bark of fibrous texture has a highly mucilaginous taste; in powder is much used as a demulcent. It should be free from starch. Ten grains shaken with an ounce of water should form a thick jelly-like fawn coloured mass. *Decoction.*—1 in 8. *Dose.*—2 to 4 ounces. A mucilage 1 in 16⅔ was Official in U.S. **Glycogelatin Pastils** are prepared containing 2 grains.

Urginea.—Indian Squill. *U. indica* and *Scilla indica* are now *Off.* and preparations Acetum, Pilula Ipecacuanhæ cum Urginea, Pilula Composita, Oxymel Urgineæ, Syrupus and Tinctura correspond with Squill preparations for use in the Tropics.

Vanadium, (V = 51).—Meta-Vanadic Acid, $HVO_3 = 100·008$ and Sodium Meta-Vandate, $NaVO_3 = 122$. Of these the last has been used in chlorisis, phthisis, and rheumatism as tonics and antiseptics.—*Dose,* 1/32 grain (0·002 Gm.) or 1/5 the quantity injected hypodermically. Soluble in water, 2 in 1; decomposes in the presence of organic matter. Improves appetite and nutrition. B.M.J.E. ii./01,88. **Vanadine.**—A liquid preparation of French manufacture, said to contain a vanadium salt and sodium chloride. Is used for gastralgia and dyspepsia.

Vanillin. Methylprotocatechuic Aldehyde. $C_6H_3OH.OCH_3.COH.$ 4 : 3 : 1 = 150·104. Occurs in white acicular crystals, having a strong odour if obtained from *Vanilla planifolia* (*Orchidaceæ*), U.S. (the cured full-grown but immature fruit), but is mostly made synthetically from guaiacol or from eugenol or from coniferine, a glucoside obtained from coniferous woods. Soluble in alcohol, ether, and oils, sparingly so in water. Use suggested in atonic dyspepsia as an excito-motor stimulant. For employment as test, *vide Vol. II.* **Solutio Vanillin.**—Vanillin 80 grains, Alcohol 90% to 1 ounce. For ordinary purposes ½ drachm will flavour a pint of medicine. For methods of manufacture and estimation of Vanillin, see Allen, 1910, Vol. III., p. 513, *et seq.* **Essence of Vanilla** 1 in 8 by macerating Vanilla Beans 1 finely ground with Sand 1, in a mixture of Water 2, and Alcohol 90% 6. From this are prepared **Glyl** and **Syl Vanillæ** *q.v.*

Marked skin irritation caused by local use of Vanilla Essence in a hair wash. Relieved by Mercuric Iodide in Spirit.—Leggett, B.M.J. i./14,1351.

Elixir Vanillini Compositum: N.F. *Dose.*—½ to 1 drachm. Mix Syrup 300 and Water 550 in several portions with shaking. Then Tincture of Caramel 20 (Caramel 1, Alcohol 2·5, Water to 10). Finally Water to 1000. Filter with Kieselguhr.

Compound Spirit of Vanillin 20, with Alcohol 80, add Glycerin 25, then

Spiritus Vanillini Compositus. N.F. *Dose.*—½ to 1 drachm, Vanillin 40, Oil of Orange 10, Oil of Cardamom 2, Oil of Cinnamon 2, are dissolved in a sufficiency of Alcohol to make 200. Store in tightly stoppered amber bottles away from light.—Am. Jl. Ph., Nov., 1911, 550.

Veratri Viridis Rhizoma.—GREEN HELLEBORE RHIZOME.
Dose, in powder.—1 to 5 grains.
The dried rhizome and rootlets of *Veratrum viride* (*Liliaceæ*), imported from and official in U.S. It contains the alkaloids Jervine, Veratrine, Veratroidine, and others. Its powder excites sneezing. The rhizome of *V. album* (*Liliaceæ*) *White Hellebore*, emetic, purgative and parasiticide, contains the alkaloids protoveratrine, jervine, rubijervine, and pseudojervine. It possesses similar properties, was official in U.S., in addition, under the collective name Veratrum. Cardiac, arterial, and nervous sedatives. They are said not to be narcotic, but they lower the pulse, respirations, and temperature of the body; act on the heart as powerful cardiac poisons. They do not lower the temperature in health. In puerperal eclampsia small doses hypodermically said to be valuable, giving chloroform until the veratrum takes effect.—B.M.J. ii./08,1670.

Tinctura. B.P.C. 1 in 10 of 90%.—B.P. 85, 1 in 5. *Dose.*—5 to 15 minims.

The U.S. **Tincture** (*average dose*, 15 minims) is 1 in 10 Alcohol 94·9% volume.
Useful in apoplexy from hæmorrhage or effusion, and for cerebral complications in erysipelas.

Fluidextract U.S. Hydro-alcoholic 1 = 1. *Average dose.*—1½ minims.
High arterial tension in eclampsia, a common and dangerous condition, can be reduced by 20 minim doses hypodermically of a tincture every hour until the pulse is reduced to 60 beats per minute. When pulse begins to rise 10 to 15 minims every hour until it again falls to 60.—B.M.J. ii./12,1127.

Veratrone.—A proprietary preparation 1 Cc. of which is equivalent to 20 minims of tincture. In eclampsia.—B.M.J. i./14,141.

Veratrum Viride must be distinguished from **Helleborus Niger** (*Ranunculaceæ*), or **Christmas Rose**, which is purgative and emmenagogue and has strong sternutatory properties, and is now little used.

Verbascum Thapsus P. Dan. Great Mullein (*Scrophulariaceæ*). Has been used in phthisis; has anodyne demulcent and diuretic properties. Tincture 1 in 8, Alcohol 60%. *Dose.*—20 to 60 minims.

Verbena Officinalis.—Vervain. Has been used as a remedy for epilepsy.

Verbena triphylla. Cultivated in Southern Europe, is used as a febrifuge and sedative in the form of an infusion, and enters into the composition of certain tonic wines. The leaves yield about 0·19% of an oil resembling Lemon-grass Oil, with which it is often adulterated.—P.R., July 23, 1914. p. 240.

Viburnum, BLACK HAW (*Off.* and U.S.). Bark of *V. prunifolium* (*Caprifoliaceæ*) (or *V. Lentago*, U.S.). Antispasmodic, diuretic, nervine tonic. For dysmenorrhœa and threatened abortion. Extractum Liquidum (*Off.*). *Dose.*—1 to 2 drachms. 1=1 Alcohol 70%. *Flavoring.*—Syl Menth. Pip., Syl Lavand., Syrup Aurant. Tincture 1 in 2 Alcohol 60%. *Dose.*— 2 to 4 drachms.—L. ii./09,204. Elixir Viburni prunifolii, B.P.C. Liquid Extract 12·5, Compound Tincture of Cardamons 7·5, Aromatic Elixir to 100. Compound Elixir, B.P.C. is Liquid Extract of Viburnum 50, Dry Extract of Hydrastis 1·75, Oil of Coriander 0·5, Oil of Caraway 0·5, Glycerin to 100.

Vinca major—Great Periwinkle Herb. Is astringent, and has been used for menorrhagia. Infusion, 1 in 10. *Dose.*—A wineglassful frequently; Liquid extract, 1 to 2 drachms.

Viola Odorata.—Has been used in cancer both internally and externally. **A liquid extract** is prepared (2=1 of fresh leaves). *Dose.*—Internally, 1 teaspoonful. May also be rubbed in locally. A fomentation of the leaves is also said to have given relief. The various species of Viola have similar properties. The herbaceous parts of the plant are mucilaginous, emollient, and slightly laxative. The root acts (in *dose* of 30 to 60 grains) as an emetic and cathartic. 'Princess of Wales' violet leaves are preferred. Contains glucosides amounting to 5% of the fresh leaves to which activity is probably due. The leaves may be carefully dried at 50° C. and powdered. The powder (20% of the fresh leaves) for administration in cachet and for making infusions and poultices. **Liquor Violæ Glucosidi.** *Dose.*—½ ounce thrice daily. Is manufactured by macerating the fresh leaves two days in alcohol 90%, then percolating with alcohol to extract completely. Distil off most of the alcohol, and make up to volume with water (containing alcohol 30%) so that 1=1. Violet preparations in over 50 cases have relieved the pain, fetor, and size of malignant growths.—B.M.J. i./06,382. No alkaloid has been detected nor Salicylic Acid.

The drug controls offensive discharges. Large doses are said to cause indigestion. A non-alcoholic solution of the active principles had anæsthetic action to the conjunctiva and sciatic nerve endings. Is contra-indicated in feeble heart and where the liquor causes dyspepsia. Give hypodermically ½ to 1 drachm twice daily.—L. ii./06,1318. **Syrupus Violæ.** — Macerate fresh flowers 2 in alcohol 90% 1, 8 hours, press and add water to 2, filter and add syrup 18. **Ionone.**—Artificial violet perfume is made by action of alkalis on a mixture of Citral and Acetone in presence of water.—P.J. ii./06,377. It has composition $C_{13}H_{20}O$, and is an oily liquid with Sp. Gr. 0·935. It contains the two isomers α-ionone (Sp. Gr. 0·932), having the sweeter odour, resembling Orris, and β-ionone (Sp. Gr. 0·946), which more resembles the fresh violet flower.—P.R. July 5, 1914, p. 184.

Viola Tricolor.—Flowering plant of Wild Pansy. Is stated to contain Glucosides similar to the above. Is used externally as an ointment, and a poultice. *Dose.*—10 to 60 grains in infusion. An infusion in milk 1 in 10, Very useful in acne vulgaris. The plant contains Salicylic Acid, and Violaquercitrin $C_{27}H_{30}O_{16},2H_2O = 646·407$.

Viscum album.—Mistletoe (*Loranthaceæ*). The berries are said to be emetic and purgative. The plant contains Visein, a kind of birdlime—Japanese Birdlime, which has been used as a plaster and is largely employed for making sticky fly-papers. Has been given for epilepsy and hysteria.—L. i./04,111. *Dose*, in powder, 10 to 60 grains. Recommended for chorea.—W. W. W. Hæmoptysis arrested by 13 grain (?) pills.—M.A., 1908,23.

In albuminuria is of value. Solid extract used, 0·1 to 0·3 Gm. per diem. Acts best when blood pressure and tension is high.—B.M.J.E. ii./08,24.

✱**Guipsine** (T.M. 310351) **Pills** stated to contain 0·05 Gm. of active principles of this drug. Fresh mistletoe contains a volatile alkaloid and two saponins and emetic and cathartic resin. Guipsine is stated to contain all these excepting the resins. It lowers arterial tension due to a central vaso-motor action, and to be without any depressing action on the heart itself. For use in arterio-sclerosis. The action is said to be due to two saponins in it.—Pr. May, 1911,690. Guipsine in asthma.—B.M.J. ii./11,1508. The pressor action of an American Mistletoe.—P.J. ii./11,462,—ex Jl. A.M.A. Sept. 9/11. Physiological action of mistletoe.—P.J. ii./10,685.

Xanthoxylum. U.S.—Dried bark of *Xanthoxylum Americanum* (Miller), Northern Prickly Ash; or of *X. Clava-Herculis* (Linné), small (Southern) Prickly Ash (N.O., *Rutaceæ*). Fluidextractum 1 = 1. *Average dose.*—30 minims. Hydro-alcoholic. Stimulant employed in rheumatism.

Xanthoxylum Capense. *Syn.* KAFFIR, UM-NUNGU-MABELE; DUTCH, PAARDE PRAM. Knob-wood; Wild Cardamom. The Kaffirs use an infusion of the root bark. Draughts of this infusion are taken whilst eating the flesh of animals that have died from anthrax. In these conditions Dr. W. Anderson Soga states: "So far as I know no death has resulted from eating of such deadly carrion."—C.D. i./10,115.

X. Senegalense, a Gold Coast drug, contains an alkaloid Artarine which produces muscular irritation and physiological disturbances similar to those of Veratrine. The bark has stimulant properties and is used locally in rheumatic affections and intestinal troubles.—L. ii./16,812.

Yerba Santa (*Eriodictyon glutinosum* or *E. californicum*).—Leaves are aromatic and sweetish, often agglutinated together; they are stimulant in bronchitis, phthisis, and other catarrhal affections. Fluid extract, 10 to 40 minims. *E. californicum* is Official in U.S. FLUID EXTRACT 1=1. *Average dose*, 15 minims. Contains crystalline Eriodictionone $C_{15}H_7O\,(OCH_3).(OH)_4$.

P1 ✱ **Yohimbine** (T.M. 232617) **Hydrochloride,** $C_{22}H_{30}N_2O_4HCl(?) = 422·838$. The salt of an alkaloid obtained from Yohimbehe or Yumbehoa bark (*Rubiaceæ*), is a reputed aphrodisiac. 1% solution in Alcohol. *Dose.*—5 to 15 minims. According to Allen, 1913, Vol. VII., p. 93, Yohimboa is a species of Tabermontana used by the Cameroon natives. He gives formulæ:—Yohimbine Hydrochloride $C_{22}H_{23}O_3N_2HCl$, M.pt. 287° C. Nitrate $C_{22}H_{28}O_3N_2HNO_3$, M.Pt. 276° C. The Nitrate is soluble 0·9% (=1 in 111) in cold water.

Manufacture.—According to Patent 11,647 of 1900 (expired 1914) the Yohimbehe bark is extracted with dilute Acetic Acid and the liquor precipitated with Sodium Carbonate and the alkaloidal base recrystallised from Alcohol. Melting point 234° C.

Ⓟ**Tablets** contain $\frac{1}{12}$ grain. *Dose.*—1 thrice daily; may be increased to five. It has erotic powers.—B.M.J.E. i./01,103; i./05,28.

If the internal administration not successful, injections of 7 to 15 minims (½ to 1 Cc.) of a 2% solution may be tried.

A few drops of a solution ½ to 1% strength act as an anæsthetic when applied to the cornea. There is no mydriasis, and the anæsthesia lasts for an hour.—L. i./05,1012. 25 Cc. of a 1% solution has been injected subcutaneously.—B.M.J.E. i./05,28.

Corynanthe Yohimbi (true Yohimbi bark) contains at least 4 alkaloids totalling 0·3 to 1·5%.—P.J. ii./07,783.

We have had reported to us that after seven Tablets of Yohimbine gr. 1/13, a patient experienced a sense of heart failure, 'felt as if heart would burst,' fainting, cold sweats, severe frontal headache, great depression of spirits, muscular weakness, walked like an old man—had foreboding of being taken ill. No sickness or diarrhœa. Attack lasted about 12 hours before he felt right again after stopping Tablets. This occurred again in the same patient when he reverted to drug after two tablets.—C. W.

Ⓟ✱**Aphrodine** (T.M. 294665) Tablets contain Yohimbine for stud purposes. Yellow Tablets contain 0·001 Gm., grey 0·01 Gm., and red-coloured 0·1 Gm. Dose according to kind and weight of animal.—C.D. i./08,13.

Experiments on bitches seem to show that Yohimbine possesses the property of affecting ovarian nutrition by inducing a constant supply of blood to the ovaries. Mammary secretion was also stimulated. When excessive doses are given nervous irritability is produced. Experiments abroad on male animals indicate a marked aphrodisiac effect.—P.J. ii./09,184.

Prior to the war Yohimbi Bark was exported from the Cameroons to Germany. A plant in the French Congo also yields the alkaloid and has been worked up since in France. The Bark (from Togoland) has also been imported to Liverpool. Either it is carried from the Cameroons to Togoland or the Togo Bark is not identical. For Botanical notes see C.D. '19,1103.

VACCINES AND ANTITOXINS.

Sir A. E. Wright gives the following as the fundamental principle of **Vaccine Therapy**,—"*to exploit in the interest of infected tissues the unexercised immunising capacities of the uninfected tissues.*" Vaccines have now been employed in the treatment of a large number of infections, both general and local, with results sufficiently encouraging to warrant the hope that this method of treatment will prove to be of general application and utility. In some instances for example, in furunculosis and other localised Staphylococcal infections, and in bronchitis and other infections of the respiratory tract due to the pneumococcus, the results have been most striking, so that apart from questions of dosage and methods of control the method has practically passed beyond the stage of controversy in these conditions. In many other diseases, such as typhoid fever, gonococcal infections, septicæmia and endocarditis encouraging observations are on record. Vaccines have given valuable results in the prophylaxis of disease. Sir A. E. Wright suggests that as each individual may possess a susceptibility to some special organism, Vaccine Therapy will in the future enable each to escape the consequences of this susceptibility by affording a protection.—L. ii./10, 863,954. The aim is to employ a vaccine which will, when given in proper dose, stimulate the chemical machinery of the patient to elaborate the required specifically bacterio-tropic substances.—L. i./14,1.

Opsonic Index estimations were originally employed as a guide to the dose and intervals but they are now little used, careful observations of the focal and constitutional reactions having taken their place.

(*For further consideration of Dose of Vaccines vide p.* 837, *et seq., also under each disease.*)

With regard to the **Antitoxin treatment**, Behring showed that toxins produced by the diphtheria bacillus when injected into an animal effected an immunity, and that the serum of this animal induced immunity to the disease when injected into another, and that it could be employed for treating the disease in the human body.

The antitoxins contained in this animal blood serum probably combine chemically with the toxins circulating in the blood and tissues of the sick person, they by so doing *neutralise the power of the toxins*, and thus the human body is recuperated.

Ehrlich considered in his "**Side Chain**" **theory** that the protoplasmic molecule is in the nature of a chemical with its central radical, and a number of lateral groups or side chains (Receptors), each of which according to its character is capable of combining with certain bodies, *e.g.*, food stuffs, toxins and every blood or cell poison existing.

The Toxins of diphtheria and tetanus are extra-cellular "soluble" toxins excreted by the bacteria, found in the fluids in which they are cultivated. But in the case of typhoid and plague, the toxins are apparently inherent in the bacterial cell; in this case there are two substances involved—first, an immunising body existing in the serum *after* treatment with the bacterium; the other, the "**complement**" which is present in normal serum in small quantity.

This accounts for the fact that antityphoid serum can only neutralise a small lethal dose of the typhoid bacillus, and possesses little curative effect—the complement being absent, bacteriolysis, *i.e.*, destruction of the bacilli cannot proceed.

The absence of success with the antityphoid and anticholera sera in man may be due to the fact that the "complement" in man is not met by an appropriate immune body in these sera. It has been suggested to employ in these diseases an injection of **Normal Horse Serum** at the time of administering the antitoxin so as to increase the amount of the complement.

ANTIBODIES.

Antibody is a substance found in the blood serum as result of the presence in the blood of a foreign *protein* termed its *antigen*. Thus, if a foreign protein, *e.g.*, egg albumen be injected, the blood serum acquires a new property, that of precipitating a solution of egg albumen, such as was used for the injection. Here the albumen is the antigen and the new property is assumed to be due to a new substance—an antibody called *precipitin*. Antibodies are always *specific*, for example, diphtheria toxin acting as an antigen leads to production of diphtheria antitoxin which has no action on the toxin of tetanus. Antibodies may be classified according to effect produced on combining with corresponding antigen, thus :—

Antibody.	Antigen.	Action.
Antitoxin	Toxin	Neutralisation.
Precipitin	Coagulable Protein ..	Precipitation.
Agglutinin	Cells, bacteria, etc. ..	Clumping.
Cytolysin (including Bacteriolysin and Hæmolysin).	Cells, bacteria, etc. ..	Prepares cells, bacteria, etc., for solution by complement.
Opsonin	Cells, bacteria, etc. ..	Prepares cells, bacteria, etc., for ingestion by leucocytes

It is not certain that opsonin should be classed as an antibody. Some, possibly all, the true antibodies may play the part of an opsonin.—W. D'Este Emery, L. i./11,485. For a further abstract of this paper, dealing with a modified Bordet Gengou reaction for diagnosis of tuberculosis, *v. Vol. II.*

Two substances are required for the destruction of the microbe —the so-called *immune body* produced during the injection treatment—the other known as the *complement* exists already in Normal Serum and is not elaborated in increased quantities by the injections. The immune body is supposed to possess two receptors, one of which binds it to the bacterial endotoxin and the other satisfies itself by combining with the complement. The possession of this double affinity of the bacteriolysin is recognised in its name of amboceptor. It must be regarded as an intermediary body which on being added to the bacteria during the process of immunisation gives to them a chemical affinity for the complement existing already in the blood serum. The complement—not the immune body, effects the destruction of the bacteria. The complement has been definitely isolated as a chemical substance.—Sir Wm. Whitla, B.M.J. i./13,1145; L. i./13,1507.

In Serum treatment a substance is introduced into the patient's circulation which already contains the Antitoxin and which has the power of uniting with the toxin to form an inert substance—somewhat after the manner of an acid and base forming a salt.—P.J. ii./10,661. Contrast this with *Vaccine* treatment wherein the tissues of the body are stimulated to form the necessary antibodies for themselves.

Commenting on this, 'Xrayser,' C.D. ii./10,861, remarks many of the immunisators seem to forget the human factor in their calculations. No two human beings are alike, especially in pathological conditions, and the vaccine therapists are apt to ignore the individual characteristics of the patients, or, the patient individual who often for months on end submits himself to their tender mercies. Not until they have much more complete and satisfactory methods of diagnosis than they have at present can vaccine therapists be justified in predicting success in any given line of treatment, especially in tubercle.

Pleural effusion has been treated by autoserum therapy, *i.e.*, 1 Cc. of pleural effusion is withdrawn and injected immediately under the skin of the back. Repeated, if desired, as often as required. Diuresis and rapid absorption of the fluid follow. 14 out of 15 cases of serofibrinous and hæmorrhagic pleural effusion gave excellent results. Pyrexia was not found to be a contra indication. The injection of pleural fluid probably stimulates formation of specific Antibodies.—B.M.J.E. ii./10,4.

Immunity may be (1) *Natural* where the organism is naturally insusceptible to the poison; (2) *Acquired* (*a*) developed as result of recovery from infective disease, or by artificial introduction of gradually increased doses of toxin—this is *active immunity*; (*b*) produced by introducing an antidote to the poison in the shape of animal serum previously immunised,—this is *temporary* or *passive immunity.* When a person is exposed to infective disease there may be natural immunity, or he may acquire same and develop power to resist the poison. On recovery there will remain an excess of antitoxic substances rendering him less liable to contract the disease again. In measles, typhus, scarlet fever, the disease runs its course until patient acquires active immunity, or the microbes triumph. The medical man of the twenty-first century may be able to treat his patients with definitely pure chemical compounds in place of dead bacteria and the products of the tissues of infected animals.—R. B. Wild, P.J. ii./10,615.

In the future, antibodies may be increased in the organism by methods other than the injection of dead bacilli. Phagocytes will possibly be stimulated or the repellent powers of bacteria will be neutralised by the injection of sterile modified serum.—B.M.J. ii./10,858.

Immunity Reaction consists essentially in the exercise of certain capacities of *defence* on the part of the body cells in response to the exercise of certain capacities of *offence* on the part of bacilli, cocci or protozoa, which cause the disease. This paper also divides the types of immunity into '*acquired*,' *i.e.*, that depending on previous exercise of capacity of recovery by the immune individual, and '*natural*,' which is an innate character arising through the selection of more resistant individuals during racial experience of disease, and like all *innate*, as opposed to *acquired* characters, it is transmitted from parent to offspring. The albino rat, for example, is said to be immune to anthrax, or at any rate the absence of pigment (for some unexplained reason) points to an immune type. In cancer, on the other hand, the absence of pigment in the rat is associated with increased susceptibility to cancer on implantation. The *nitri-receptors* (disease toxins can be regarded as food), must, in such animals, be incapable of affording anchorage to the toxins of such organisms. The rabbit is unsusceptible to the action of belladonna,—a poison to other species of rodents,—it is dissociated and assimilated or excreted by the body cells just like ordinary food material. Natural immunity of a *positive kind*, *e.g.*, in the case of individuals more or less immune to tuberculosis consists in a perfected form of recovery response established during vaccine experience of the disease in which the body cells or special defensive cells, or body fluids or both, immediately respond without the necessity for any preliminary training or any attempts on the part of the disease organisms to invade the tissues.—B.M.J. i./11,1157.

Sucking a Wound.—A theory has been put forward that when an animal sucks a wound, the bacteria and their toxins enter the gastro-intestinal tract and the toxins are absorbed especially through the tonsils. Antibodies are then produced all through the body exactly as happens when a vaccine has been prepared and administered in an infinitely more complicated fashion. In part support it is pointed out that the only severe infections from which animals suffer are those of the head, a part, which in the nature of things, cannot easily be licked.—P.J. ii./11,492.

Immunity Problem and Organic Evolution.—B.M.J. i./12,409.

Teale and Embleton are of opinion that the **Pathogenicity and Virulence of Bacteria** depend on the presence in the susceptible animal of a ferment capable of producing lysis of the proteins of the bacterial body; the mechanism of the cellular defences of the body is hindered by the setting free of anti-phagocytic substances (**Aggressins of Bail**), with result that the bacteria multiply to numbers sufficient to cause disease or death. By previously sensitizing animals in the anaphylactic sense Teale and Embleton were able to alter the amount of specific ferment in the animal body so that bacteria, *saprophytic* for a particular animal became *parasitic* and led to the development of a specific disease or even a fatal septicæmia. Virulence depends on the power of the bacterium to exude around itself a zone of its cytoplasm which remains in position and acts as a protective shield. This shield in some cases is the visible capsule protecting the bacterium against specific ferments. Pathogenicity is then due to the virulence of the bacterium and the relative activity of the ferment to the bacterium. Immunity is due to ferment action and phagocytosis.—L. i./13,234, 332; B.M.J. i./13,224.

Hort and Penfold criticise these conclusions pointing out sources of error in experimental fever by methods of injection. The difficulty of selecting an animal with stable internal body temperature; another difficulty, according to them, is the obtaining of absolutely pure water free from Pyrogen. The third possible error is the presence of lime salts from hardware filters. These are depressants and tend to mask the effects of injecting water contaminated by the presence of pyrogen.—L. i./13,344.

Teale and Embleton in reply state guinea-pig temperatures are very constant except for normal diurnal variations; as to the water difficulty, the experiments being in series would all have the same error (if any). They enquire as to the amount of Calcium obtained from a Pasteur Chamberland filter (made of Aluminium Silicate) by water containing practically no CO_2.—L i./13,413.

The answer is that the Pasteur Chamberland filter is not innocent of Calcium and that water coming from condenser tubes is not sterile.—L. i./13,482. *c.f.*, Vol.II., Bacteriological Examination of Distilled water for this last point.

Sera are always made as **Polyvalent** as possible, *i.e.*, many strains of the bacterium are employed for inoculation.

In the **preparation of Antiserum** the toxin is injected subcutaneously into the animal, *e.g.*, the horse, with strict aseptic precautions. Some reaction, rise in temperature and malaise occur. Further injections are made at intervals. The quantity injected is gradually increased, and subsequently the injections may be intravenous. The blood is removed from the animal by the aid of a large sterilised canula, from the jugular vein, 6 to 12 litres may be collected in sterile flasks. The clot is allowed to form by standing 24 to 48 hours, and the serum is decanted into sterile bottles after the addition, by some manufacturers, of 0·3% of Trikresol or 0·2% of Phenol.

Some of the disadvantages of Serum Therapy.—Certain types of bacteria, *e.g.*, the *Streptococci* and *B. Coli* are only general names for very numerous families, and the antibodies efficient against one member may be altogether without effect on another member of the family. Polyvalent sera have been attended with some success but many failures may still be ascribed to this difficulty. Further, the added immunity in the use of a serum is limited in kind and extent. Most antisera have a considerable content of antitoxin but contain little bactericidin, lysin or opsonin, hence though their introduction may neutralise the toxins circulating in the patient's body, little or no effect is produced on the infective agents themselves and these are left to elaborate further supplies of toxin. Again the Serum may render the patient anaphylactic, or hypersensitive to future injections of serum from that animal from which the antiserum was prepared. To guard against this it is necessary to inquire before use whether and when the patient has been previously treated with an antiserum.—R. W. Allen, Jl. Vac. Therapy, July, 1913.

Coming now to the more detailed consideration of **Vaccines** the following table giving approximate initial doses for treatment and for prophylaxis in the adult which we have arranged should be useful for reference :—

Table of Vaccines.

Arranged alphabetically.

VACCINE.	PROPHYLACTIC DOSE.		THERAPEUTIC DOSE.	
	INITIAL.	FINAL.	INITIAL.	FINAL.
Acne Bacillus	Not used.		5 mill.	500 mill.
Actinomycosis	,,		5 ,, or 0·001 mgr.	100 ,, 0·02 mgr.
Cholera	500 mill.	2000 mill.	Not used.	
B. Coli	500 ,,	2000 ,,	25 mill.	500 mill.
Combined for Colds	100 ,,	1000 ,,	50 ,,	1000 ,,
B. Diphtheriæ	Not used.		25 ,,	500 ,,
B. Dysenteriæ	500 mill.	2000 mill.	50 ,,	1000 ,,
B. Friedländer	250 ,,	1000 ,,	50 ,,	1000 ,,
Gonococcus	Not used.		25 ,,	1000 ,,
Hay Fever	50 units.	1000 units.	5 units.	500 units.
B. Influenzæ	500 mill.	2000 mill.	100 mill.	2000 mill.
M. Catarrhalis	250 ,,	2000 ,,	50 ,,	1000 ,,
M. Melitensis	1000 ,,	2000 ,,	50 ,,	1000 ,,
Meningococcus	Not used.		50 ,,	2000 ,,
B. Ozaenæ	,,		50 ,,	1000 ,,
B. Pestis	500 mill.	1000 mill.	50 ,,	1000 ,,
Pneumococcus	250 ,,	2000 ,,	50 ,,	2000 ,,
B. Pyocyaneus	Not used.		25 ,,	1000 ,,
B. Septus	250 mill.	2000 mill.	50 ,,	2000 ,,
Streptococcus	250 ,,	2000 ,,	25 ,,	1000 ,,
Strepto. Rheumaticus	Not used.		5 ,,	1000 ,,
Strepto. Scarlatinæ	500 mill.	2000 mill.	10 ,,	1000 ,,
Tuberculin, A.F.	Not used.		0·00001 Cc.	1 Cc.
,, B.E.	,,		0·00001 Cc.	1 Cc.
,, M.	,,		0·00001 Cc.	1 c.
B. Typhosus (and B. Paratyphosus)	500 mill.	2000 mill.	250 mill.	1000 mill.
B. Whooping Cough	500 ,,	2000 ,,	100 ,,	2000 ,,

In **Prophylaxis** the above doses are suitable in the majority of cases. The **Intervals between doses** should never be less than 7 days and may be extended to 14 days with advantage.

In **Treatment** as regards dose it is a safe rule to follow that the more acute the infection and the more "toxic" the patient the smaller the initial dose. The doses above stated are sufficiently small except possibly in severe generalised infections with marked toxæmia in which perhaps the doses may be halved. As regards **Intervals** there is no general rule but the smaller the dose the shorter should be the interval between doses. Thus in septicaemic cases where minimal doses are employed these may be required daily or every other day. Clinical signs, the focal and general reactions afford the necessary guidance.

R. W. Allen's 'Practical Vaccine Therapy" (H. K. Lewis, 1919) may well be consulted for further information.

Combined Vaccines. The simultaneous use of a combination of organisms does not entail reduction in doses of the constituents.

Doses for Children:—

Under 3 years.	1/5 adult dose.
From 3–7 years.	1/4 adult dose.
From 7–10 years.	1/3 adult dose.
From 10–14 years.	1/2 adult dose.

Varieties of Vaccines.

The following are in use :—

(1) The ordinary type of vaccine which is a suspension (emulsion) of the killed or attenuated bacteria in Normal Saline with, as a rule, ½% Phenol or Trikresol as antiseptic.

(2) **Sensitised Vaccines.** Suspensions of the dead or living organisms which have been treated with the corresponding Anti-serum with the result that certain antibodies in the serum enter into close combination with the bacteria. The advantages claimed for these vaccines have perhaps hardly been realised. They have, however, their uses, and certain modifications, *e.g.*, Gibson's Antidysenteric Vaccine, may prove of distinct value.

(3) **Detoxicated Vaccines.** Thomson has recently evolved the idea of treating bacteria, *e.g.*, the gonococcus, with an alkaline solvent whereby the stroma or bacterial protoplasm and the toxic endotoxin are dissolved. On treatment with acid or acid salt the stroma is again precipitated, leaving the toxin in solution—the latter is rejected and the bacterial substance, after washing and suspending in suitable slightly acid medium, is used therapeutically. Tuberculin "M" also belongs to this class.

(4) The toxic products of the bacterial growth, either *e.g.*, as in the case of Mallein in an albuminous medium, or as in Tuberculin "A.F." in a medium which is protein-free. The former clearly contain the products of metabolism of the protein-containing medium, while the latter contains only the toxic excretions of the bacilli and small amounts of endotoxin liberated by autolysis of the organisms.

Preparation and Standardisation of Vaccines :—

A Vaccine is best prepared from the organism isolated from the patient, but in case of *B. Tuberculosis* this is not essential, and there are many obstacles in the way in other diseases, *e.g.*, in the case of *Gonococcus* it may be hopeless to secure a pure culture, and the loss of time may be of immense importance. In the case of tubercle it is suggested to employ a stock Tuberculin while a special one is being prepared from the case. *Staphylococcus Albus* and *Aureus* are usually in (i.) a state of purity, though in limited numbers, or are (ii.) mixed as in periostitis and osteo-myelitis. *Streptococci* are isolated from pus or blood (for the latter 5 Cc. at least are necessary). Dilutions of ½, 1 and 2 Cc. with 10% of Sodium Citrate are made with 10 Cc. of broth incubated at 37° C. The colonies develop in the clot which forms, and the organism is further isolated in the usual manner.

For *Gonococcus*, Blood Agar or Nutrose Ascitic Agar and other special media are used; for *Pneumococcus* Human Blood Agar. For *B. Coli*, McConkey's Medium (2% Agar containing 2% Lactose coloured by Neutral Red, *c.f.* Vol. II.), is used. *Friedlander's Bacillus* is isolated with ease by cultivation in broth—it inhibits all other organisms. *B. Septus* or *B. Coryzæ Segmentosus* is easily plated from nasal or pharyngeal mucus, *M. Catarrhalis* from the same source by aid of Blood Serum, or Blood Agar plates, the *Meningococcus* from the cerebro-spinal fluid by lumbar puncture and culture on blood serum.

The Vaccine is then standardised by mixing with *an equal volume* of normal blood together with 4 or 5 volumes of Sodium Citrate Solution, and counting the red corpsucles 'R' and the bacilli 'B' in a given area. Knowing that a cubic mm. of blood contains 5,500,000 Red Corpuscles we have

$$\text{Number of Organisms per Cmm.} = \frac{5{,}500{,}000 \times B}{R.}$$

The organisms are then devitalised by a temperature of 56° C., and the Vaccines introduced into $\frac{1}{2}$ and 1 Cc. tubes. Preservative in the form of Trikresol as mentioned, is added. We are informed that the use of Phenol may cause carboluria in intolerants.

Gravimetric Standardisation of Vaccines.—Evaporate the Bacterial Emulsions to dryness in a tared dish and weigh residue. The method is more rapid, etc., than counting methods. From experience in practice 1/500 mgr. of Dried *Streptococci*, 1/300 mgr. of *B. Coli* and 1/100 mgr. of *Staphylococci* are suitable doses. 8,000 million *B. Typhosus*, 6,400 million *B. Coli*, 14,000 million *M. Melitensis* and 3,000 million *Staphylococci* are equivalent to 1 milligramme.—W. J. Wilson and Dickson (Jl. Hygiene, 1912, 12,49–59); J.C.S.A., ii./12,708: L. ii./12,530. The presence of non-volatile solvent, Sodium Chloride, etc., would have to be taken into account.—W.H.M

Method of **desiccating the bacteria,** powdering, and storing in glass tube to be redissolved when required.—Peel Ritchie, B.M.J. ii./12,1294.

The **Hæmocytometer** may also be used.—J. G. Callison, Jl. Med. Research, Nov., 1912.

Again, there is the **opacity method** which employs, for example, a previously standardised suspension of freshly precipitated Barium Sulphate in Glycerin.

Standardisation of Vaccines by observing the degree of opacity that is capable of being seen through in looking at ordinary letter-press (*e.g.*, of Muir & Ritchie's Handbook).—L. ii./13,1760.

Interaction between the tissues and the dead micro-organism occurs by which antibacterial substances are liberated into the blood stream. The reaction, by reason of the minute dose of dead bacteria and the magnitude of the response in the tissues, may be compared with the prolonged action of enzymes. The Antitoxins in a *serum* probably act simply by neutralising an equivalent amount of toxin—any further action being due to the presence of dead micro-organisms in the serum, which act as a feeble vaccine. This would explain the lack of result with sera except in diphtheria, where the development is limited, and in which the destructive power is in the toxins poured into the circulation. The theory of **immunisation** depends on the human being having a sufficiency of antibacterial substances to kill off the infecting organism. If the latter gains access and colonisation begins, the destruction of a portion of the invaders strengthens the defending force. This phenomenon—(**auto-inoculation**—*vide* later) is best seen in the pneumonic crisis, or in the rise of protection after a crop of boils. The protection may be lasting as in small-pox, or very transient, as in tuberculosis.—A. Butler Harris, Pr. i./09,647.

The bacterial invasion, if there be no tissue destruction or undue paralysis of function of the nervous system, may, starting from the death of a few of the bacteria in question, lead to self immunisation and recovery, and the introduction of a bacterial vaccine may form the turning point, producing, as it does, the reinforcement of the defending forces that was necessary.

Inoculation of the virus of an infective disease in suitable dose raises resistance of the patient towards the particular disease—the principle in question has been employed for the last 100 years in vaccination.—M.P. Nov. 17/09, p. 520.

As regards **immunising power,** the following is approximately the **order of Merit** of some of the principal vaccines, commencing with the most potent :—

Pneumococcic Vaccine and
Catarrhal organism Vaccines (excluding Influenza)
Typhoid ,,
Gonococcic ,,
Streptococcic ,,
B. Coli Vaccine.
Acne and Staphylococcic Vaccines.
Influenza Vaccine.
Dysentery Vaccine.
Cerebro-Spinal Meningitis Vaccine.

Dose* of *Vaccines.—In order that an adequate supply of immunising substances may reach the part the stimulus applied to their formation must correspond, and measures must be taken to increase their accessibility to the part. Thus in a *septicæmia* the bacteria and their toxins are speedily carried to the site of formation of immune bodies ; this also holds to a less degree, say, in the case of a *prostatitis,* and to a much less degree for an infection located in the *skin, cornea* or *conjunctiva.* In the case of a *gonococcal septicæmia* the correct initial dose is, therefore, smaller than in the instance of a *gonococcal prostatitis,* whilst for conjunctivitis the increase in dosage must be correspondingly greater. For a severe *pneumococcal septicæmia* an initial dose of ten millions will suffice ; for an established *pneumonia* where the pneumococci are certainly in the lung tissues and probably in the blood, twenty-five millions may be employed ; for a *pneumonic catarrh* where the pneumococcus is located in the mucus and superficial tracheal or pharyngeal cells fifty or a hundred millions may be requisite ; finally, for a *pneumococcal keratitis* or *ulcus serpens corneæ,* a minimum of 250 millions may alone avail. The relative toxicity of the vaccine must also be taken into account. This depends partly on the organism in question, partly upon the method of preparation ; *overheating a vaccine for sterilisation purposes materially increases its toxicity.* The toxicity of a staphylococcal vaccine is but slight, that of one of the *Bacillus Coli* considerable ; the initial dose in toxæmic conditions of the former vaccine may, therefore, be greater than that of the latter ; still the amount of toxin introduced along with even a considerable dose of vaccine must be relatively very small. The focal reaction when this can be observed in the first place and the general or constitutional reaction in the second, *i.e.,* pulse, temperature, general condition, and clinical signs and symptoms, with a bacteriological examination of the secretion, if any, act as complete guides in determining future doses and intervals.—R. W. Allen, "Polyclinic."

Too large a dose of Vaccine would cause an unpleasant reaction, and it would do harm by diminishing instead of increasing the opsonic content of the patient's blood. Not only must the proper dose of Vaccine be given but the successive doses must be spaced and not given too close to one another, for the first effect of the injection of Vaccine is always to depress the opsonic index, *i.e.*, to diminish the opsonic content of the serum—this is the "negative phase" of Wright.—R. T. Hewlett, P.J. i./13,250.

GENERAL REFERENCES TO VACCINE THERAPY

The application of Vaccine Therapy is limited *firstly* by the fact that the capacity for antibacterial response in the body is limited, *secondly* by the existence of individual peculiarities of disease manifestations, *thirdly* by the fact that we are still in the dark as to the means to be adopted to bring out the highest degree of antibacterial response. The body fluids containing antibacterial substances must have free access to the focus of infection,—*c.f.*, the difficulties in tuberculosis and typhoid carriers (in which latter the Bacilli are multiplying on free surfaces of the body). There are no hard and fast rules regarding dosage and intervals—each vaccination must be looked upon as an experiment of a most tedious character.—L. ii./10,1626.

1,000 inoculations,—chiefly in private practice. The report includes (α) cures and hopeful cases, (β) relapses, and (γ) absence of response to the treatment. Series No. 1 included whitlow, furunculosis, acute otitis media, dermatitis, lymphangitis, abscess, carbuncle, acne, etc. 28 out of 32 of this series were α; Series II. (Strepto. Infection) 3 out of 4 were α; one of these, an extraordinary case of a woman run over by a motor bus. No bones broken, but great laceration of tissues; these broke down and inflammation extended so that the limb was simply a bag of pus. First 500,000 Cocci given without effect 3 days later 3 million caused drop of temperature from 105 to normal, and limb and life saved. Series III., Coli Infection, 4 out of 6 α; Series IV., Catarrhal Organisms, 7 out of 8 α; Series V., Tubercle Infections, 17 out of 37, α, 5 β, 8 γ.—B.M.J. i./11,128.

Vaccine Therapy in Eye Work.—*Imprimis* correct diagnosis essential. *Ophthalmia neonatorum* depends on infection of several organisms—the Gonococcus, Streptococcus, Staphylococcus, and others. In Vaccine Therapy, by imitating nature antibodies are created at the site of injection, distant from the original infection, and these circulating in the blood stream exert a beneficial effect on the distant lesion. Tuberculin, Staphylococcic and Streptococcic Vaccines, as also Gonococcic Vaccines have proved themselves of value in eye work.—J. W. H. Eyre, B.M.J. ii./10,1310.

Serum and Vaccine Therapy in connection with diseases of the eye. —C. W. G. Bryan, B.M.J. i./12,589,662.

Whether ocular tuberculosis be due to *Typus Humanus* or *Typus Bovinus* is unknown, hence if one variety of Tuberculin produces unsatisfactory result, give the other a trial, or use both together. Conjunctivitis, both acute and chronic, is benefited by bold use of the appropriate vaccines. Vaccines valuable in the various causes of corneal ulceration, especially in the case of Pneumococcus and Gonococcus. Acuteness of infection no contra-indication whatever to this mode of treatment, which has proved most successful in infection due to the *Streptococcus*, *Staphylococcus*, *Gonococcus*, *Pneumococcus*, *B. Coli Communis*, *B. Friedlander*, *B. Morax Axenfeld* and other organisms.—R. W. Allen, Pr., May, 1908.

Clive Riviere quotes such methods as poulticing and fomentations as examples of "Empirical Vaccine Therapy." "Irrigation often constitutes auto-inoculation." In infections of the mucous membranes, *e.g.*, bronchitis, the increased flooding (by means of Emetine, Salts of Antimony, Apomorphine and the Iodides) of the mucous membrane with healing serum is no small element in their favourable result. All these drugs cause a watery exudation through the bronchial mucous membrane. In the same way Squill and Ammonium Carbonate, besides being expectorants, are gastro-intestinal irritants and emetic in full doses. Thus they increase the secretion from the bronchial mucous membrane and at the same time raise the general blood pressure by their action as vaso-motor and cardiac tonics, hence increase the blood supply to the bronchial tubes by both systemic and pulmonary blood channels.—L. i./11,220.

Disappointments with Vaccine Therapy—notably in chronic staphylococcic skin infections and in tuberculin treatment of lupus vulgaris. Most dermatologists will not now recommend Tuberculin treatment as a likely cure for lupus vulgaris.—H. G. Adamson, L. ii./18,172.

Autogenous Vaccines, advantages of. Recent advances in vaccine therapy.—H. E. Annett, B.P. Conf., 1919.

Technique of Injecting a Vaccine.

The skin over the selected area should be sterilised with Iodine or Diluted Diffusol or other Cresylic Disinfectant; too strong applications should be avoided.

Site of Injection.

The best sites are in order :—(1) the arm, preferably the upper arm near the insertion of the deltoid ; (2) 1½ inches below the centre of the clavicle ; (3) high up on the buttock near the spine ; (4) the flank.

The inoculation may be made either into the subcutaneous tissue as sites (1) and (2) above or into the muscles (site 3). The injection is made with a sterile all-glass syringe, the ampoule being thoroughly shaken before drawing up the contents, as the emulsions tend to settle and may adhere strongly to the glass.

A good fold of tissue is taken up between the left thumb and forefinger, the injection is made boldly, and the puncture wiped with antiseptic. Vaccines are occasionally given *by the mouth* ; this method should only be employed when the subcutaneous route is contra-indicated, as in cases of widespread skin infection, or other special reason. The stomach should be absolutely free from food residues and the vaccine should be diluted to 10–20 Cc. with normal serum or saline. In cases with furred tongue or catarrh of the stomach this method is absolutely contra-indicated. The rectal method should never be employed.

Local and General Effects of the Injection.

(*a*) *Local.*

In 12–24 hours there may be some redness, swelling, pain, and tenderness at the site of inoculation, and for an area of 2–3 inches around it. This affords little or no indication of the immunising response—as many other factors are concerned, *viz.* (1) the volume of the inoculum (which should be small); (2) the amount of antiseptic; (3) the property of the bacillus for forming powerful toxins; (4) the laxity or otherwise of the tissues into which the injection was made; (5) the number of bacteria employed.

(*b*) *General Effects.*—

(1) One of the results of the administration of an appropriate dose of the appropriate vaccine is the production of a local hyperæmia round and in the infected focus; this is best seen in cases of iritis, laryngitis and acute skin infections. (2) Other effects which vary with the dosage are a rise in temperature in about 12 hours, which should not exceed 1·5° F., a rise in pulse rate, which should not exceed 20 beats, a slight feeling of malaise and perhaps a little headache; these should all pass off within 24 hours: if the temperature and pulse were previously unduly high they then should assume a better level, and the malaise and headache should be succeeded by a feeling of increased well-being.

Other clinical symptoms should also improve. If none of these result the dosage employed was too small.

The signal for reinoculation is retrogression of the patient or failure to continue to improve.

Increase of dosage is indicated by failure to secure any general reaction, or by mere transitory improvement on the part of the patient.

The more acute the lesion and the greater the toxæmia of the patient the smaller should the initial dose be; in the case of the more chronic lesions a considerably higher (2–10 times) initial dosage may be safely used. When the blood and lymph supply to an affected part is poor, as for instance the skin and cornea, still higher doses are advisable.

Experiences with Vaccines in general practice.—Influenza, sore throat, "common cold" and another complicated case, apparently result of an insect bite or sting.—Recovery under Vaccine Therapy.—G. Morris, Jl. V. Therap. July, 1912.

Selection of cases and the careful regulation of the dose, essential. 400 cases of acute and chronic infective diseases treated by Vaccines.—Pr., July, '13,96.

Acne.

The **Acne Bacillus**, *Syn.*, **Bottle Bacillus**, may alone be the cause of acne, especially of the non-pustular forms,—in the majority of cases, however, it is associated with the Staphylococcus.

Acne Bacillus Vaccine. *Syn.*, **Acne Bacterin**, is indicated in the above cases where comedones are the principal features. Combination with polyvalent staphylococcus albus vaccine may be advisable. *Initial dose*, 5 millions; 20 millions is the usual necessary maximum,—a final dose of 50 millions may be wanted. Occasionally patients tolerate and indeed require for cure up to 500 millions as the final dose. The interval between successive doses is 7 to 10 days.

Ampoules are prepared each containing these doses.

For cultivation of the Acne Bacillus and preparation of the Vaccine vide Vol. II.

Acne treated by stock Vaccine without a failure.—B.M.J. ii./11, 1576. Not a panacea. Acne has been made worse by Vaccines,—two cases disfigured for life by the treatment.—L. i./11,743.

Acne Bacillus and Staphylococcus Mixed Vaccine is prepared in the following doses for use in cases where the presence of both these organisms is known or suspected:—

Acne, 5 millions with Staphylo. 100 and 250 millions ; Acne, 10 millions with Staphylo. 250, 500, 1,000 and 2,000 millions ; Acne, 20 millions with Staphylo. 2,000 millions.

The infection is a dual one in most cases,—few patients fail to get well on the Combined Vaccine. *Streptococcus pyogenes longus* was found, however, in one case in the pustules indistinguishable from the common acne ones. Some consider *B. Acne* to be an obligatory anaerobe,—Allen does not agree. Details of *culture of the Bacillus.* With regard to Vaccine treatment, an autogenous Vaccine is desirable. Begin with 100 million Staphylococci and 5 million Acne—these are minimal efficient doses. With regard to repetition of dose, Allen prefers such doses as produce a slight aggravation of symptoms for rather less than 48 hours followed by improvement lasting about a week, *i.e.*, in an average case *repeat the above dose* 4 *or* 5 *times at weekly intervals before increasing to* 250 *million Staphylococci and* 5 *million Acne.* After 3 or 4 repetitions of this, increase the Acne to 10 million, subsequent increases being to 500 million Staphylococci with 10 million Acne and so on,—rarely exceeding 20 million Acne with 2,000 million Staphylococci,—the duration of treatment may be between 6 and 12 months.—R. W. Allen, Jl. Vaccine Therapy, Vol. 1, No. 1, Jan. 1912.

Anthrax.

Vaccines have been prepared by cultivating the bacillus under conditions unfavourable to its growth, by which the toxicity is greatly reduced, but they are not on the market. The following serum has been considerably used :—

Anti-Anthrax Serum (Sclavo's). Each tube contains 10 Cc.

An Antibacterial Serum, stimulating the activity of the phagocytes. Prepared by immunisation of asses at Siena in Italy.—(Legge).

Dose.—In three or four different parts of the skin of the abdomen, injections of 10 Cc. each are made at one time. After 24 hours if there has been no improvement either in the general or local condition, further injections of 20, 30 or 40 Cc. are to be made (*i.e.*, 8 tubes in all may be required for one case).

A rise in temperature following on the injection of the serum is to be regarded as a favourable indication. Sometimes a rash develops three to eight days after treatment, with or without febrile symptoms. If it occurs it is unimportant. The earlier the treatment can be commenced, the more easily can the infection be combated. The Serum *will keep* for two years in the dark—a slight deposit in it is negligible. *Technique of the Injections.*—Disinfect the skin with a little Ether, and then with a 2 per 1,000 Sublimate solution or with Ether Soap, *q.v.*

After injection wash the site of injection again and apply a drop or two of Collodion.

For **intravenous injection** in severe cases 10 Cc. repeated after 2 or 3 hours if necessary into, where possible, one of the superficial veins at the back of the hand, distended by pressure on the forearm.—L. ii./05,803.

Results with Sclavo's Serum.—Use recommended both hypodermically and by the mouth. Effects reduction in temperature and increased feeling of comfort and well-being. Those wool-workers who have worked for some time sorting wool appear to acquire slight forms of Anthrax which give them immunity. A case of recovery by Sclavo's Serum first intravenously, then in the loin and subsequently *per os.* Bacteriological examination of blood and fluid removed from the chest was throughout negative: (Undoubted cases of internal anthrax rarely show the bacillus in blood or pericardial or pleural effusion more than 24 to 36 hours before death, hence justified in diagnosing by clinical symptoms).—B.M.J. i./11,751.

In a case successfully treated there was apparently an incubation period of 10 days,—rapid amelioration of the symptoms after the injection of the serum, and recovery without excision of the pustule,—most cases have been excised.—B.M.J. ii./11,103.

Prevention of Anthrax Infection due to imported hides.—Seymour Jones' "Formic Mercury" process for disinfecting. Hides, skins, etc., are treated in the "soak" process with Formic Acid 1 to 2% and Mercury Perchloride 0·02%.—L. ii./11,1260.

Whereas in 1905 the mortality from anthrax was 35·2%, for nine months of 1913 it was only 5·4%.—T. M. Legge.

Shaving brushes infected conveyed anthrax—infection probably due to disease in the animals from which the hair used in their manufacture was originally obtained.—R. R. Elsworthy, L. i./16,20. See also E. H. Snell, and E. W. G. Masterman, L. i./16,242.

Similar source of infection. The serum promptly used saved patient's life. A swab examined at Torquay from a pustule found to contain Anthrax B. at 11 p.m. 'Phoned to Martindale's for serum which was placed on the train leaving Paddington at midnight. It was administered to patient before 6 a.m. and undoubtedly saved patient's life.—C. Owen, P.J. i./17,62.

Malignant Pustule.—A variety of external anthrax,—two cases at Brighton. One recovery by excision and painting with raw Carbolic Acid, the other terminating fatally.—Reference is made to the native method of burning out anthrax in the Argentine with a piece of red-hot wire.—L. ii./10, 1275.

Asthma.

Bacteria are not the universal cause of asthma—they are merely one of the excitants of the asthmatic attack. In 51 cases (1909—1911) the sputum collected a few hours after commencement of the attack showed :—

B. Influenzæ,	average	percentage	12%.
Pneumococci	,,	,,	26%.
Streptococci	,,	,,	96%.
M. Catarrhalis	,,	,,	72%.
M. Paratetragenus	,,	,,	20%.

The low percentage of *B. Influenzæ* and *Pneumococci* is very marked but when they occur their significance is correspondingly greater. The almost universal occurrence of the *Streptococcus* group is striking and corresponds to its etiological importance. *Streptococci* are present in almost all cases in which bronchitis symptoms are in abeyance. *M. Catarrhalis* and *Pneumococcus* are the more common in cases in which bronchitis is a marked feature. The Vaccine treatment of asthma is especially difficult owing to possible sudden change of infection.

Initial dose of the various Vaccines required :—

B. Influenzæ 100 millions, **Pneumococcus** 50 millions, **Streptococcus** 25 millions, **M. Catarrhalis** and **M. Paratetragenus** 50 millions.

Whether the Vaccine is likely to prove of service or not will be determined by the response to this dose or to one of double magnitude. Allen states, with this disease more than with any other, each case must be considered and treated on its own merits.

The bacteriology of 15 cases in 1912–1913. *Pneumococci* predominated. Results encouraging.—J. H. H. Pirie ; B.M.J. i./13,1270

Bronchitis and Pulmonary Catarrh.—In 104 cases during three years, 1909—1911 :—

B. Influenza	was present in	40%.	*M. Paratetragenus*	was present in	23%
Pneumococcus	,, ,,	52%.	*B. Friedlander group*	,, ,,	7%
Streptococcus	,, ,,	53%.	*B. Septus*	,, ,,	2%
M. Catarrhalis	,, ,,	72%.	*Streptothrix*	,, ,,	3%

(The sputum must be examined after suitable washing out of the mouth and throat, and expectoration by coughing up into a sterile bottle immediately on waking.)

The marked relative absence of *B. Septus* is notable. The infections of the lower passages are commonly mixed ones. The importance of the *pneumococcus* as the causative agent of certain cases of acute suffocative catarrh has been pointed out by S. West (P. Roy. Soc. Med. 1911, Med. Sect. p. 101). Allen is inclined to regard this organism as, at the same time, the most frequent cause of bronchial catarrh and the most dangerous to the patient. Note also that *B. Influenzæ* may be resident in the bronchi or pulmonary cells without giving localised though marked constitutional symptoms. The sputum voided may be almost *nil.*

Doses of the appropriate Vaccines are given under the various headings.

Autogenous Vaccines are more likely to be efficacious than stock ones and it must be remembered that variation in the flora is liable to occur during the progress of immunisation, hence repeated examination necessary.

Bronchitis is pre-eminently suited for Vaccine therapy—old age and a desperate condition of the patient are not contra indications to Vaccine treatment. Accuracy in diagnosis of the infecting organism or organisms is essential. We know personally a case in old age which was extraordinarily benefitted by an autogenous Vaccine.—W. H. M.

For further notes on Treatment, see Allen, " Bacterial Diseases of Respiration," 1913, p. 90, *et. seq.* and Practical Vaccine Treatment, 1919.

Chronic or frequently recurrent bronchitis 16 cases. In 1913 J. H. H. Pirie did not find *B. Influenzæ.* The organism was rare at the time in Scotland. Results on the whole good.—B.M.J. i./13,1269.

Bronchitis, asthma and complications, especially bronchial catarrh and dyspnœa following influenza, pneumonia and acute bronchitis. Success with autogenous vaccines.—T. and G. Bodley Scott, L. ii./12,879.

Autogenous Vaccine Therapy in bronchitis. Loopfuls of fresh sputum sown on Agar, Pfeiffer's Agar or Nasgar and Vaccines made after 15 to 36 hours growth. Subculturing was purposely avoided. *M. Catarrhalis* the predominating organism with *pneumococcus.* The frequent accompanying forms of *M. Catarrhalis* can do no harm.

Dose increased about 1/3 to ½ of the former one—*initial* dose being about 25 to 40 millions. Special stress laid on using *fresh* sputum. Sterilise by heating at 60° C. for ½ hour. Give dose large enough to produce a reaction, but avoid a prolonged negative phase.—H. T. Gillett, B.M.J. i./13,387, *q.v.*, also for further references *re* Bacteriology of Bronchitis.

Purulent Bronchitis. Its influenzal and pneumococcal bacteriology. Prophylaxis—at weekly intervals beginning in September and January a vaccine containing 100, 250, 250, 500, 500 million pneumococci and twice as many B. influenzæ confined to those who have infected foci or who are susceptible to bronchial and pulmonary infections. Incidence rate may be diminished by the Chloramine or Zinc Sulphate atomiser as used for meningococcus carriers.—R. W. Allen, L. ii./17,509.

Catarrh, Nasal and Tracheal.

The organisms principally involved—either singly or mixed, in setting up acute catarrhal infections of the respiratory tract are the *B. Influenzæ, Pneumococcus, B. Septus, Streptococcus* and *M. Catarrhalis.* The organisms appear in cycles. Thus *B. Septus* may be found in 80 to 90% of the cases in each epidemic for two or three successive years and then disappear altogether for 4 or 5 years. Cases of catarrh, acute or chronic, set up by *Friedlander's B., B. Septus,* or *M. Paratetragenus* have not been seen for years. Those due to *Hoffmann's B.* have been few indeed and for the past three years *M. Catarrhalis* seems to have lost its virulence. (Allen—Practical Vaccine Treatment, 1919).

Combined Vaccine for Colds and Influenza (Allen—Wimpole Institute) is a special preparation. The composition of this vaccine is altered slightly from time to time to suit prevailing epidemics; for general use at present it contains *B. Influenzœ, Pneumococcus, Streptococcus, B. Septus,* and *M. Catarrhalis* in the proportions 2 : 1 : 1 : 1 : 1.

Ampoules for Hypodermic Use contain 25, 50, 100, 250, 500 and 1000 millions of each organism respectively with exception of *B. Influenzœ* which is double.

Initial dose.—The contents of an ampoule containing 50 millions of each organism.

Children of 10 to 15 years should receive half doses.

A dose of 100 millions as a preventive against colds in those subject to such attacks, followed in 7 days by one of 250 millions, and again after 7 days by one of 500 millions, which may well be repeated or increased to 1000 millions if no marked reaction ensue, has proved very efficacious. It is also suitable for immunising against and treatment of influenza.

The earlier the treatment is begun the better (with patient in bed); inoculation is best in the evening between 7 and 10.

Has proved of great value not only in the treatment of catarrhs, acute and chronic, but also in cases of pulmonary phthisis, where bronchitic symptoms are conspicuous—in such cases where Staphylococci or Streptococci are the secondarily infecting organisms no good can be expected from the use of this vaccine.

A dose of this Vaccine in 48 hours completely cleared up a stubborn catarrh with most intractable swelling of the turbinals, which had resisted all ordinary remedies for a week.—D. J. Munro, 25/1/13.

Bacillus Septus Vaccine.—Infection by *B. Septus* usually begins with dryness or tickling of the soft palate, the inflammatory condition extending within 24 hours to the nasal mucosa, so that sneezing and discharge of thin nasal mucus result, and to the pharynx causing pain in swallowing. Cough other than pharyngeal is not present and expectoration scanty. After three or four days a subacute stage follows the acute. This also lasts about the same time. True chronic infection with the organism is rare.—R. W. Allen, Jl. Vacc. Ther., July, 1912.

The Vaccine is for use in simple cold which has begun with sore throat, where cough and tracheitis are absent. The initial dose of 50 millions may be given at any stage of an attack, best at bedtime, and may be repeated or increased in five days. For immunising purposes a dose of 250 millions should be followed in 7 to 10 days by one of 500 millions, which after another 7 to 10 days should be repeated or increased to 1000 millions. The resultant immunity lasts for 4 to 6 months on this. *Ampoules* contain 50, 100, 250, 500 and 1000 millions.

This organism is contained in the Combined Vaccine for Colds (above).

Cases of pneumonia treated with stock mixed cold Vaccine (St. M. H.). Temperature came to normal in 24 to 36 hours. Some pneumonias may have a mixed origin and so yield more readily to a vaccine of this kind.—A. C. Wilson, L. ii./15,253.

Friedländer's Bacillus Vaccine (Wimpole Inst.).

For use in treatment of nasal catarrh, alkaline antiseptic douches being used as adjuvants; should prove of benefit and prevent the recurrence of fresh attacks of "cold" so far as this organism is concerned; also of service in chronic bronchitis and urethritis. The *initial dose* of the "Friedländer" vaccine is 50 millions.

To be repeated or increased at intervals of about 7 days. Ultimate dose 1000 millions.

Uncomplicated chronic nasal catarrh is very often due to *B. Friedländer,* when the Eustachian tube and middle ear are involved to the *M. Catarrhalis,* and when the antrum or sinuses are involved to the *Pneumococcus* and *B. Influenzæ.*

Ampoules for Hypodermic Use contain 50, 100, 250, and 500 millions.

Fibrosis of lung well treated by stock vaccine.—L. i./14,1911.

Micrococcus Catarrhalis Vaccine.—Is of service in nasal tracheal and bronchial catarrhs, both acute and chronic, in bronchitis and bronchitic asthma and in catarrh of the middle ear, when the causal relationship of this organism to the attack has been demonstrated. *Initial dose* of 50 millions may be repeated in 5-7 days. In chronic cases 1,000 millions or more may be ultimately necessary.—L. ii./08,1661.

Ampoules contain 50, 100, 250, 500, and 1,000 millions.

M. Catarrhalis is one of the constituents of the Combined Vaccine for Colds *antea.*

M. Catarrhalis infections may begin at any part of the respiratory tract—characteristically with an inflamed feeling of the fauces and nasopharynx.

Chronic tracheal catarrh is usually due to infection by this organism or *M. paratetragenus,* to which secondary infection by staphylococci, streptococci, pneumococci, and other organisms may be added, or to the pneumococcus alone.

Cultivations from the trachea show that non-Gram-staining *Cocci* are present in 78% of normal throats, and 68% of catarrhal throats. Experiments on the author of the paper tended to show that lack of food and clothing and excessive exercise did not predispose to taking cold—on the contrary, warmly clad and well fed he took cold later. The organisms may be present in a certain number of cases, showing no pathological features; increase of virulence and lowered resistance of the tissues may then light them up to activity. Each organism produces its own type of cold. Multiple infection also to be considered.

Fifty cases of "common cold" in the epidemic raging at the end of 1908 showed 90% to have been due to *pneumococcus,* either alone or complicated by *M. Catarrhalis* or *M. paratetragenus*, or both. Dose of pneumococcus vaccine, not to exceed 50 million for a first injection may be combined with 50–75 million of *M. Catarrhalis* or *M. paratetragenus*. Ten days later a double dose.—R. W. Allen, L. ii./08,1589, 1594, 1956, i./09,500.

M. Catarrhalis is well known as a cause of common colds and the more serious influenza, bronchitis, and pneumonia. Causes very irritable cough with scanty viscid expectoration. It grows best on blood agar, and produces no acid in glucose broth.—Distinction from *M. paratetragenus*, a coccus of variable size widely observed in epidemics during the winters of 1907—1908. *B. Septus* causes a mild pharyngitis with painful throat, muscular pain, with, however, no temperature and little or no nasal catarrh,—probably a common cause of stiff neck and muscular rheumatism. *B. Friedländer* occurs in many acute and chronic colds,—cause of very profuse coryza.—Benham, B.M.J. ii /09,534.

M. Catarrhalis and M. Paratetragenus. Characters described.—B.M.J. ii./09,1338.

The bacteriology of chronic post-nasal catarrh.—Most infections (*M. Catarrhalis, Friedländer*) did well under Vaccines—except pneumococcic infection. —P.R.S.M., Otol. Sect., Feb., 1911, p. 51.

M. Tetragenus Septicæmia. An autogenous vaccine containing this and a pseudo-diphtheroid bacillus (non-pathogenic), gave good results.—L.i./13,1723.

Respiratory diseases—14 cases treated with vaccines of *M. Catarrhalis*, *pneumococci*, *stapyhlococci*, *streptococci*, etc.—Good results.—R. J. Rowlette, L. i./15,1339.

Chronic Nasal Catarrh treated by Autogenous Vaccines ; a good proportion of cures.—L. Mackey, B.M.J. ii./19,159.

Directions for taking secretion for preparations of an Autogenous Vaccine.

If in the throat, the mouth is to be washed out in the morning with sterile water, and the throat to be gargled, as also teeth washed with same, then patient is to spit once into a sterile bottle. If, on the other hand, the infection is in the nose, the entrance to the nostrils should be washed with soap and water and discharge blown into a sterilised bottle.

Vaccines by the Mouth.—These catarrhal (and other) Vaccines are occasionally ordered to be taken *by the mouth* on an empty stomach, but the method is little used and not recommended.

For recent information on Vaccines used in Catarrhal infections see also **Influenza and Pneumonia.**

Cerebro-Spinal Fever, *Syn.* **Cerebro-Spinal Meningitis. Malignant Purpuric Fever, Petechial Fever, Spotted Fever.**

Characters of Cerebro-Spinal Fever.

It is an acute epidemic disease, characterised by profound disturbance of the central nervous system, indicated at the onset chiefly by shivering, intense headache or vertigo, or both, and persistent vomiting ; subsequently by delirium, often violent, alternating with somnolence or a state of apathy or stupor ; an acutely painful condition with spasm—sometimes tetanoid—of certain groups of muscles, especially the posterior muscles of the neck, occasioning retraction of the head, and an increased sensitiveness of the surface of the body. Throughout the disease there is marked depression of the vital powers ; not unfrequently collapse ; and in its course an eruption of vesicles, petechial. or purpuric spots, or mottling of the skin, is apt to occur. If the disease tend to recovery, the symptoms gradually subside without any critical phenomena, and convalescence is protracted ; if to a fatal termination death is almost invariably preceded by coma. After death the enveloping membranes of the brain and spinal cord are found in a morbid state, of which the most notable signs are engorgement of the blood vessels, usually excessive, and an effusion of sero-purulent matter into the meshes of the pia mater and beneath the arachnoid. The name ' Spotted Fever ' given to this disease is a misnomer as the spots are by no means constantly in evidence.

Useful "Remarks on Cerebro-Spinal Fever in **Camps and Barracks**" by Sir Wm. Osler, include the following. The disease spreads slowly or indeed not at all from foci of prevalence in various parts of a country. It has prevailed chiefly in the winter and spring months; an epidemic rarely lasts into the summer. It has a higher death rate than any acute infection except plague and cholera but the total mortality is not great as the case incidence in the community is low. It will kill within 24 hours—or less.

As a rule the organisms disappear from the naso-pharynx of healthy "carriers" in the course of a few weeks. The organism (meningococcus) is a germ of low virulence, widely spread in the community and of intense virulence in an individual once it has passed the portals of protection. Whether the organism gains access by direct invasion of the meninges from the naso-pharynx through the ethmoidal or sphenoidal routes or by the blood stream is a matter of discussion—the latter is more likely. The disease may be endeavouring to win a place among the great epidemics of the world. Soldiers are peculiarly liable (owing to exposure to bad weather and crowding in barracks, etc.), but in the great campaigns of the 19th century cerebro-spinal fever played no part as a camp disease.—B.M.J. i./15,189.

The mode of entry of the meningococcus is *via* the blood stream. Ordinarily the coccus is carried to the meninges by the blood within a few hours without definitely infecting the blood itself. In some cases septicæmia occurs. The meningococcus does not necessarily produce naso-pharyngeal catarrh but catarrhal conditions predispose to meningococcic infection.—C. Worster-Drought and A. Mills Kennedy.—L. ii./17,711.

Royal Society of Medicine (Section of Epidemiology and State Medicine) Debate:—

Various strains of the organism exist—to one of which the name parameningococcus has been given. The *healthy* carriers seem to play the most important part in the spread of the disease. Discrimination between the meningococcus and the gonococcus a matter of some importance—gonococcic meningitis does occur, but rarely. The Army Medical Department eulogised by Lord Kitchener for energetic action.—L. i./15,612.

East African epidemics. The disease has assumed very virulent characters. In 1913 in one tribe it killed anything between 20,000 and 40,000. Description and division of the infection into five general types.—E. N. Butler, L. i./15,692.

The incubation period may be as long as 30 days.—B.M.J. i./15,521.

Clinical features in children.—F. E. Batten, L./i.15,964.

A Diphtheroid rod closely related to the K. L. bacillus—possibly a variant of it—suggested as the causal organism.—R. Donaldson, L. i./15,1333.

The meningococcus is very susceptible to cold and to drying. It will not grow below 25° C. and without precautions against drying it will die out even at 37° C. It has never been isolated from dust, etc.—J. C. G. Ledingham, B.M.J. i./16,465.

Some blood-sucking insect may convey the disease as meningococci are found (only in rare cases) in peripheral blood films. Organisms stained by Giemsa's Stain show great resemblance to gonococci.—A. C. Coles, L. i./15, 750,1046; see also E. L. Hunt, L. i./15,881.

Overcrowding must be prevented. Ventilation essential, all windows to be open day and night.—H. Sutherland, L. ii./15,862; ii./16,829.

Gordon and Murray carried out a systematic examination of a number of cerebro-spinal fluid meningococci and divided same into **Four Groups**, Types I. to IV. Types I. and II. are the main groups. P. Fildes confirms their results.—L. i./18,92.

Two main types distinguishable by agglutination. Both types (I. and II.) held responsible as causative agents. II. is probably the parameningococcus. A monovalent horse serum of appropriate type would be better than polyvalent sera.—A. W. M. Ellis, B.M.J. ii./15,881. J. A. Arkwright, *ibid*, 885. See also L. ii./08,728.

Inhibitory action of saliva (normal) on the meningococcus. The action is due to its content of living bacteria (streptococci). Hence avoid contamination with saliva in taking swabbings from naso-pharynx.—M. H. Gordon, B.M.J. i./16,849.

Saline solution of strength between 0·85 and 0·9% is toxic to the growth of this organism. 1·5% has practically no toxic action but it resists the action of distilled water.—Report to Med. Res. Com., C. Shearer, L./ii.16,902.

Age incidence. In the epidemic of 1914–1915 and 1915–1916 the real most susceptible age was under 5 years—*i.e.*, during infancy and early childhood. There was a marked falling off of cases after adolescence was passed. The least susceptible age apparently was 35–40. It is a weather disease associated with the sudden saturation of the atmosphere with water vapour. The naso-pharyngeal mucous membrane is then more easily traversed by the meningococcus.—A. Crompton, L. ii./17,14.

Lumleian Lectures. Epidemiology. Mode of spread of infection. Path of meningeal invasion. Clinical forms—a very exhaustive paper.—Sir H. Rolleston, B.M.J. i./19,406,536.

Meningo Carriers, Study of.—D. Embleton and co-workers.—L. ii./19,679.

Older General References.

An epidemic of the disease occurred in New York 1904–1905 and was responsible for great mortality.

Antipyrin, Phenacetin, and Opium are useful. Hydrotherapy in the form of the tub bath at 98° is recommended by Aufrecht. All cases bear stimulants well.

A paper on cerebro-spinal meningitis in the Northern Territories of the Gold Coast. No drug seems to have any specific effect. Calomel and a counter-irritant in the form of Liquor Iodi or Liquor Epispasticus over the cervical spine gives some relief to the headache. Cardiac tonics advisable, Phenacetin and Caffeine if temperature unduly high. Chlorodyne gives great relief. Spinal puncture and removal of as much fluid as will pass away gives relief Further points on diagnosis are given. Steps and precautions to prevent spread of outbreaks.—L. ii./08,1218.

Repeated lumbar puncture and injections of Lysol (1% Solution used) or one of the Silver Salts, or even permanent drainage of the spinal canal recommended as therapeutic measure.—L. i./07,478; L. ii./08,478.

Flexner's Official Report on the epidemic.—B.M.J. ii./06,1023.

Introduction by spinal injection of a highly immune Serum obtained from the blood of patients recovered from the disease injected with their own serum taken on the sixth or seventh day of illness has been used as curative agent. Suggested use similarly in trypanosomiasis.—B.M.J. i./09,1177.

Melton Mowbray and Nottingham outbreaks in the summer of 1910. Fleas suspected of spreading the disease. While there is immense variation in quantity of attacks the general ratio of deaths to attacks is very high and serious sequelæ are always to be expected—on the other hand a large proportion of the community appear to be immune.—B.M.J. ii./10,666.

Bacteriology and Diagnosis.—A diplococcus, evidently *Diplococcus intracellularis meningitidis* (Weichselbaum), has been isolated from the cerebro-spinal fluid, and from the brain membrane, and the purulent exudate. It has been found in the nose in coryza and in rhinitic and otic discharges, and so it may be advantageous to resort to periodical ablutions of the nasal and buccal passages of the sick and their attendants. The organism resembles the gonococcus in morphology, in being intracellular, and in its non-staining by Gram's method (some say Gram negative in tissues and Gram variable in cultures), but has been cultivated without the presence of albumen, this marking it off sharply from the coccus of gonorrhœa.

The organism is grown on **Nasgar Medium** (*v. M. Gonorrhœa, Vol. II.*) or preferably on Gordon and Hine's **Trypagar.**

Gordon's Memorandum on cerebro-spinal meningitis to the L.G.B. Characters of the *Meningococcus* detailed. It will not grow at a temperature below 25° C. No soluble toxin found in cultures, therefore probably intracellular. *M. Catarrhalis* likely to be confused with it.—L. i./07,598.

Discussion on (B.M.A. Meeting). Other forms of meningitis due to other bacteria. Diagnosis. Points of difference between Weichselbaum's Coccus and **Still's Diplococcus.** Still's organism thought to be only a variation or attentuated form.—B.M.J. i./08,1334.

A case of meningitis in which *B. coli* was obtained from the cerebro-spinal fluid.—L. i./12,722.

"Chocolate" Medium made by heating 3 pts. of defibrinated bullock's blood with Trypsin Agar and 1% Glucose until it becomes a glossy opaque solid medium of chocolate colour. Results of cultivation of the meningococcus more successful than those with Serum—trypagar medium and others. H. W. Crowe, L. ii./17,201.

West's Swab for taking swabbings from the posterior wall of the pharynx consists of a wire in a bent glass tube and resembles Bellock's sound in glass instead of metal. These obviate the use of a tongue depresser. Inoculations are made *direct* onto Nasgar Medium and grown for 24 hours. Likely colonies can be cultivated on plates and incubated at 37° C. and at 23° C. Colonies growing at 37° C. and not at 23° C. and having the requisite appearance are taken as meningococci. (N.B.—Whatever medium is used cultures must always be prepared immediately).

Cambridge Hospital (Aldershot) Medium. Cultures are easily obtained on this. It consists of egg (yolk and white) 66% and water 33% and to every 100 Cc., of the mixture Glucose 3% is added and the whole inspissated at 70° C. for 2 hours or more. This is also a substitute for Loeffler's Medium for growing the Diphtheria bacillis.—B.M.J. i./15,493.

Congo-Red Blood Serum. Blood serum to which half its volume of 2 per cent. solution of Congo Red is added sets to a clear jelly after sterilisation at 120° C. Found very satisfactory for the meningococcus.

(Holland found that blood serum could be heated with acid aniline dyes without undergoing coagulation).

Loeffler's Serum forms a Medium on which the meningococcus is long-lived.—J. H. Johnston, L. i./17,81.

Laked Blood Agar and other media for meningococcus, enterococcus and B. typhosus.—W. J. Wilson and G. Darling, L. ii./18,105.

The combination of either rash or vomiting, squint or rigidity of limbs, and opisthotonos, with a clinical picture otherwise resembling Influenza is very strongly suggestive of the graver disease.—E. Hobhouse, B.M.J. i./15,419.

When the characteristic organism is easily found (intracellular) in smears in the cerebro-spinal fluid either in the 1st, 2nd or 3rd attempt it is of grave prognostic import. List of symptoms.—M. Foster, B.M.J. i./15,543.

Diagnosis depends to a very great extent on realising there are three distinct stages of the infection, viz.—(1) Catarrhal, (2) Septicæmic, (3) Meningeal.—A. Lundie, D. J. Thomas, and S. Fleming.—B.M.J. i./15,466.

E. C. Hort maintained by means of liquid cultures grown at room temperatures and warm stage experiments that this organism is an ascospore derived from a giant meningococcus by process of endosporulation. It is according to him not a bacterium.—B.M.J. ii./17,377. (For earlier papers see B.M.J. i./15,541, 715; i./16,156 (evidence against the meningococcus).

Mycologist's criticism of Hort's view that this is the spore of an ascomycetous fungus.—J. Ramsbottom, B.M.J. ii./18,204. Reply *ibid.* 269.

A swabbing from the throat in the first or catarrhal stage almost invariably shows presence of a streptococcus. The primary invasion of the mucous membrane is thought to be a streptococcus which prepares the way for the entrance of the more delicate meningococcus and should the meningococcus settle on a throat like this the way for further advance is facilitated. Subsequent stages are the septicæmic and the meningeal. Potassium Permanganate 1 in 1000 as spray in the catarrhal stage. Flexner's serum in the second and third. As much spinal fluid as will run out spontaneously—may be 100 Cc. is removed and a smaller quantity usually 30 Cc. of serum given. (The resultant must always be less than the original pressure).—A. Lundie, D. J. Thomas, S. Fleming and P.W. MacLagan.—B.M.J. i./15,836. See also L. ii./15,693.

Lymphocytic meningitis. Cases in which with acute symptoms are just like those of cerebro-spinal fever, the cerebro-spinal fluid though under high pressure contains no polymorphs and no meningococci but lymphocytes in excess. Never fatal.—W. P. Herringham, B.M.J. i./17,832.

Sugar (reducing Fehling's Solution) is absent in the acute stage, but may return in some degree as the infection recedes. *C.f., Vol. II.*

Treatment and Disinfection of Carriers.

Inhalation (? spray) composed of Iodine 12 Gm., Guaiacol 2 Gm., Thymol 0.5 Gm.. Alcohol 200 Cc. with Potassium Iodide 6 Gm. used five or six times a day. Swab the throat out with a 3 to 5% solution of Iodine in Glycerin. Used in the French Army.—Sir Wm. Osler, B.M.J. i./15,189.

Bathing of natives in East Africa exposed to infection in 1 in 400 Cyllin. Clothes in 1 in 200. Also Soamin 5 grains intramuscularly on alternate days—this thought to be secreted in the cebero-spinal fluid and to have deterrent effect on the growth of the organism.—E. N. Butler, L. i./15,692.

Repeated lumbar puncture even in severe cases with removal of from ½ to 1 ounce cerebro-spinal fluid. Excellent results—better than serum.—M. Foster, B.M.J. i./15,543.

Spraying with **permanganate** (1 in 1000) of some service in treatment. Characteristics of epidemics.—B.M.J. i./15,494,836.

Disinfect all articles likely to be contaminated by discharge with 5% Cresol. —B.M.J. i./15,521.

Lumbar puncture combined with irrigation of spinal canal with normal saline of value. Serum 10 to 30 Cc. injected after removal of spinal fluid. Soamin not without danger. F. E. Batten, L. i./15,964.

Navy 163 cases. 54% fatal. Lumbar puncture, serum and autogenous vaccines given. Hexamine *per os* no effect clinically.—Surgeon General Rolleston, L. i./15,909.

Tartar Emetic ½ grain doses intravenously following on Sir L. Rogers' use of it in Kala Azar. Temperature fell to normal in 60 hours. Headache disappeared.—S. Neave, L. i./16,1101.

Zinc Sulphate 1·2% as a steam spray or 1% Chloramine Solution directly applied for treatment of 'carriers.'—M. H. Gordon and M. Flack, B.M.J. ii./16,673,695.

Antimeningococcic Serum New (1916) of the Lister Institute.

Dose.—30 Cc. given at the earliest possible moment and repeated daily for at least 4 days except when less than this amount of cerebro-spinal fluid can be removed.

Intrathecally and intravenously successful. Types I. and II. of the meningococcus of Gordon isolated.—F. W. Andrewes, B.M.J. i./16,689,728.

Sixteen cases by lumbar puncture. Vaccines 250 million subcutaneously at the time of first dose of serum. 2nd dose 500 million increased to 2000 million.—C. Worster-Drought, B.M.J. ii./16,689.

For the purpose of standardising antimeningococcic serum, endotoxin of the meningococcus extracted by a modified Besredka's method.—M. H. Gordon, B.M.J. i./18,110. *See* also *ibid.* ii./18,335.

In the war, at first no serum seemed to have any effect. Ellis in France and Gordon at home differentiated the strains and serum became more efficacious.—Sir W. Herringham, B.M.J. i./19,20.

Meningococcus carriers treated by **Flavine** spray preceded by Adrenalin 1 in 6000 in Normal Saline. Chloramine irrigation better than flavine.—F. J. Cleminson, B.M.J. ii./18,51.

Flexner's Serum. — Used intra-spinally, subcutaneously useless. Intra-spinal injection is made under chloroform. A rigid and comparatively large trocar is used. After puncture as much fluid as will do so is allowed to run out. If the amount of fluid is not great it can often be increased by raising the patient's head and shoulders.

Dosage.—If the case is very severe, and especially if pus is found in the fluid obtained by lumbar puncture, 30 Cc. or larger doses to be given every day for three days ; (in one case 70 Cc. were injected within 20 hours after admission, with apparently good results). In cases not so urgent better not repeat the injection until after 48 hours. In this way only can the effect of the smaller dose be estimated, as the full effect of a single injection is not always apparent until after 48 hours, or longer. Sometimes a single injection of 30 Cc. is valuable. 210 Cc. have been given to a case intra-spinally. For further references *vide* E.P.XV., Vol. I., p. 875.

Flexner's Serum used in four cases—three recovered, one died. Three cases treated with Polyvalent Meningo Serum—all died. Blood, 10 Cc., removed from the median basilic vein and allowed to separate and 5 Cc. of Serum mixed with Antimeningo. Serum and reinjected by lumbar puncture—after removing a little cerebro-spinal fluid a little in excess of the substance to be injected.—Glas. Med. Jl., Oct., 1913.

Analysis of recent results. Lumbar puncture, drainage and intrathecal injection of polyvalent antimeningitis serum the most useful treatment. Phenol, Lysol, etc. injections do harm.—A. Gardner Robb, B.M.J. i./17,478.

The serum available at the beginning of the epidemic on the Western Front, largely of American origin, was found of little value in treatment, but that prepared during 1915 from a due admixture of current epidemic strains proved of considerable curative potency.—E. W. Andrewes, B.M.J. i./15,830.

Cerebro-spinal Fever in the Navy, August 1st, 1915 to July 31st, 1916.

Treatment by means of Sera, Flexner's, Gordon's, etc. Some received in addition to Soamin, Hexamine and Vaccines. Intrathecal injections with the serum show the largest percentage of recoveries.—H. D. Rolleston, L. i./17,54. Flexner's gave the best results.—L. i./18,87.

Vaccine Micrococcus of Cerebro-Spinal Fever.

May be found of service in cases of acute cerebro-spinal fever, especially if a suitable anti-serum is not available. An initial dose of 50 millions may be repeated at intervals of two or three days, or increased at each rise of temperature.

Ampoules contain 5, 10, 25, 50, 100, 250, 500 and 1000 millions.

Might be of service in affections of the eye due to epidemic cerebro-spinal meningitis.—Oph., Jan., 1911,70.

For an abstract of a lengthy monograph on this disease *see* L. i./06,1200 An account of the Weichselbaum Diplococcus.—L. i./06,1248; *vide* also B.M.J. i./05,989; L. i./07,582.

For Cerebro-Spinal Fluid, Examination of, vide Vol. II.

✱**Pyocyanase** (T.M. 307860).—Abactericidal ferment prepared from *B. Pyocyaneus* used in an influenza epidemic apparently caused by the *Meningococcus*. One to 3 Cc. of the fluid is to be sprayed into the nasal cavities. It has been employed locally in diphtheria, scarlet fever, nasal catarrh, mouth diseases and so on.—L. ii./09,1678.

Pyæmia due to *B. pyocyaneus* successfully treated by a vaccine from patient's organism. Initial dose 40 millions followed by 60 millions at 8 days, with 100 millions 10 days later, and 100 millions two succeeding fortnights—a striking example of potency of vaccine therapy. Gravity of *B. pyocyaneus* infection apt to be disregarded.—B.M.J. i./09,1169.

Cholera.

The disease is marked by the presence of the *Spirillum choleræ*.

Anti-Cholera Vaccine.—As an immunising agent only; it does not appear to possess any curative properties. A *dose* of 500 millions may be followed by constitutional disturbance, local redness, pain and swelling of the corresponding lymph glands, effects which should pass off within three days. A dose of 1000 millions should be given five or six days later and will probably produce less reaction. This dose should be repeated or doubled after a further 7–10 days. Full immunity is reached about a week later and persists for about one year.

Preventive inoculation in the war and in the Balkan Wars has been practised with evidence as to its value.

Inoculation statistics relative to Cholera and Typhoid.—Greenwood and Yule, B.M.J. i./15,1016.

Cholera and the Dardenelles. In the Balkan wars there were probably 30,000 deaths. The fate of the Turks after Lule Burgas teaches that in a few days unchecked cholera may inflict more loss than months of shell fire. Details of inoculation by Savas in the Greek Army.—B.M.J. i./15,813,898. See also Prof. Simpson, L. i./15,741; i./16,1188.

In the Græco-Bulgarian War 9·3% of men among the uninocluated were attacked, 4·2% among those inoculated once, 0·7% among those inoculated twice.—Prof. Simpson, L. i./15,746.

From December,1914,to September,1915,in Austria there were 27,591 cases and 15,270 deaths.—General V. Ziegler died of it—the only man who refused to be vaccinated.—B.M.J. ii./15,760.

Inoculation was compulsory in the Austrian Army after cholera broke out in the Serbian campaign. 1 Cc. of an emulsion of dead cholera bacilli was given subcutaneously and repeated 4 to 6 days later.—B.M.J. i./16,65.

Cholera inoculation was discussed at the German Medical Congress, Warsaw, 1916 (B.M.J. i./16,27). There was difference of opinion as to the probable duration of resultant immunity. For military purposes *double* inoculation (Cholera and Typhoid) was practised in urgent times—the cholera to be repeated in 6 months, the typhoid in 8.—B.M.J. i./16,192.

Treatment of Cholera in Calcutta.—L. ii./17,29.

Prevention and treatment by saline transfusion.—S. M. Cox, L. ii./16,3.

Cholera in Russia. Recent data.—L. ii./18,113.

Castellani has inoculated against Cholera with his Combined **Tetra-, Penta-, and Hexavaccines,** *q.v.* p. 901.

The prophylactic Vaccines of **Haffkine** have been used with success in India by employing a growth of the spirillum, the virulence of which has been increased by growth in the peritoneal cavity of guinea-pigs. They are:—(1). Weak. (2). Strong. The dose of these preparations is 1 Cc. The second is injected 3 to 5 days after the first (the weak) one. They have to be freshly prepared.

Cholera vibrios may enter and live in the bile. Out of 271 fatal cases at Puri in 1912, the vibrio was cultivated from the bile in 80 cases. From the stools of 34,461 persons, travellers from cholera infected localities, vibrios were isolated in 63 instances, of which 23 agglutinated and 40 did not. Of the agglutinating vibrios all liquefied gelatin, gave the Pfeiffer reaction and were positive to the fixation test, several did not yield Indol and were non-virulent to pigeons, only two were non-hæmolytic. Of the non-agglutinating vibrios none gave the Pfeiffer reaction and only three gave a doubtful fixation; several were hæmolytic.—Review of Tropical Diseases.—Pr., Aug., '13,218.

Cholera in Turkey during the Balkan war.—L. i./13,484.

Extent of cholera in 1912 in India, Africa and in Europe in 1913.—L. ii./12, 1810; L. ii./13,1845.

Alkaline Starch Medium for isolating **Cholera Vibrio from faeces** in the case of Carriers.

The cholera organism alone of all the intestinal organisms acidifies starch (M. H. Gordon). Emulsify Powdered Agar 30 Gm. with cold water 250 Cc. Emulsify separately Peptone 10 Gm. and Sodium Bicarbonate 1·5 Gm. in a further 250 Cc. of water. Mix and add water 500 Cc. Dissolve in the steamer, clear with egg and filter. Emulsify Potato Starch 10 Gm. in some of the (cooled) medium and add to the rest. Sterilise by the fractional method. Add Litmus solution to make it blue. Cholera colonies acquire a faint pink more quickly (24 to 26 hours) than the allied vibrios.—H. Graeme Gibson B.M.J. ii./16,454. For isolation from water see *Vol. II.*

For further references *vide* Previous Editions.

Cold Vaccine *See* **Catarrh.**

Anti-Colon Bacillus Serum. *Dose.*—10 Cc. or more. Is prepared from horses which have been immunised against a number of types of *B. coli* principally from cases of peritonitis and puerperal fever. Supplied in 25 and 50 Cc. vials.

The action of this serum is chiefly bactericidal, though also possessed of antitoxic properties.—L. i./06,71.

In acute coli infection of the kidney Dudgeon advised 25 Cc. of the Serum daily for three days, combined with Calcium Lactate to avoid rashes, joint pains, etc., better in his opinion than vaccines.—Pr. Mar. '09,352.

Investigations on *B. Coli* and the *pneumococci* showed conclusively that these micro-organisms vary in each host; and that probably there are many species which exhibit the same microscopical and cultural appearances. This goes far to explain the failures in the attempt to cure with anti-pneumococcal sera.—A. B. Harris, Pr./09, 648.

Colon Bacillus Vaccine (*see* also *'Sensitised Vaccines'*) is used in the treatment of post-surgical suppuration in abdominal cases, such as sinuses which refuse to heal after operations upon the appendix, gall bladder, kidney, or intestines; also in bacilluria complicating tubercular cystitis, in the nephritis of pregnancy, and in endometritis, when due to infection by *B. Coli.* Initial doses of 25 million organisms may be repeated at intervals of 7–10 days, and may be gradually increased till 500–1000 millions are being given. If the doses employed cause any disturbance of the general conditions as evidenced by rigors or rise of temperature this must be taken as indication either of pus under pressure or if not this, for diminished subsequent dosage.

Discharging sinuses should, if possible, be kept open, as closing is likely to result in rigors and severe constitutional disturbance.

Immunisation of the patient 3 to 4 days prior to abdominal operations in cases where the presence of pus is suspected is to be advocated—for this purpose a dose of 500 millions may be employed.

In cases of bacilluria the urine should be kept well alkalinised by full doses of Sodium Citrate or Sodium Bicarbonate.

Ampoules, for Hypodermic use, contain respectively 10, 25, 50, 100, 250, 500 and 1,000 million organisms.

Vaccine treatment of *B. Coli* infections of the urinary tract is commonly practised with generally favourable results—for numerous abstracts of papers see Edn. XVI., p. 879.

Atoxic or Detoxicated B. Coli Vaccine. 100, 250, 500, 1,000 and 2,000 million is also prepared on similar lines to the others made by Thomson's method. The bacterial substance is said to have a high antigenic value.

In appendicitis, of eight cases five were benefited, in two there was no definite result, and one died. In colitis used without satisfaction.—Athole Ross, Pr. July, '13.

Appendicitis 22 cases with anti-colon B. Serum 20 Cc. dose and vaccine 100 million a few days later.—A. Cowan Guthrie, B.M.J. i./15,67.

Arthritis treated by B. Coli Vaccine intravenously—" non-specific therapy." —Miller and Lusk, Jl. Am. Med. Assn., Jan. '16,1756, see also B.M.J. i./18,196.

Colon Bacillus, Streptococcic and Staphylococcic Vaccine.

B. Coli may help Streptococci and Staphylococci in causing puerperal septic conditions. It is thought that if *B. Coli* is found inside the uterus it has been conveyed there by the examining hand,—even with the greatest care it is impossible to sometimes avoid infecting in this way.. It would be impossible to infect a patient with Streptococci only. The above Vaccine is, therefore, useful as avoiding the delay in making an Autogenous Vaccine. Latter gave good result.—B.M.J. i./12,13.

Hay fever treated by Autogenous *B. Coli* Vaccine, *see* **Hay Fever.**

Diphtheria Antitoxin, Serum Antidiphthericum, P.G., U.S., &c.

This serum combats the disease in the human subject.

It retains its activity for 10 months if kept in a cool and dark place.

The loss in unitage may be about 10% *p.a.* in indifferent storage conditions. —A. T. McConkey, B.M.J. i./17,10.

Dose.*—The dose of diphtheria antitoxin is considered to be at least* 1,500 *units,* 2,000 *units may safely be injected whether in the case of child or adult, frequently much more is injected. For prophylactic purposes* 500 *or* 1,000 *units may be administered. The immunity caused is claimed to last for* 3 *weeks. The antitoxin may be warmed by standing in water at* 40° *C. for* 10 *minutes before injection. Avoid injecting air. Give the dose at once without waiting bacteriological* *diagnosis. Use a sterile glass syringe with small needle. Cleanse skin with ether soap and inject in the flank or between the scapulæ.*

Lister Inst. says the amount required as initial dose increases with the lapse of time from onset to the time of the injection. If not treated until the second day give 4,000 *to* 8,000. *If untreated till the third day* 8,000 *to* 12,000 *units.*

The dose used by Goodall at the Eastern Fever Hospital is 2,000 units for a mild case up to 20,000 for a severe case, repeating half this amount the next day if there is any increase in the severity of the disease. In one sense too much cannot be given, one cannot poison a person with it by an over-dose as with Morphine or Strychnine. *Give subcutaneously,*—intravenous injection is not easy in all cases. The unpleasant reactions cannot at present be obviated.—B.M.J. i./11,292.

200 units injected into the arm deemed sufficient for prophylaxis. —B.M.J. i./11,454,598.

The **number of immunising units** contained per Cc. varies in the different pharmacopœias and with different manufacturers. We deal with this matter fully in Vol. II.

By injecting **intravenously** the toxin circulating in the blood is said to be more effectually and rapidly neutralised.

For this method either complete anæsthesia or cocaine anæsthesia is necessary. The vessel must be isolated, incised, and the blunt needle introduced, and tied in position, and the antitoxin, warmed to body temperature, slowly injected. Ligature either side of the incision if any sign of bleeding ; due care must be taken to avoid introducing air bubbles.

The Antitoxin is sometimes given *per anum* and *per os*, but opinion is in general against its use in these manners.

U.S. has now **Serum Antidiphthericum** with potency of not less than 250 Antitoxic Units per Cc. and *Average Dose,* Hypodermic 10,000 units ; Protective 1,000 units; also **Serum Antidiphthericum Purificatum.** *Syn.* **Concentrated Diphtheria Antitoxin,** Antidiphtheric Globulins with the same potency and dose. Both are preserved with not more than 0·5% Phenol or Cresol. This purification by the removal of the unrequired serum albumen may reduce the untoward serum rashes which frequently occur with ordinary Antitoxin.

In addition to the liquid sera, **Dried Serum** (U.S., F.E., P.G.) in amber coloured scales is manufactured by evaporation at a temperature not exceeding 40° C., or by means of Sulphuric Acid *in vacuo.* This is more suitable for export. The scales are dissolved in sterilised water. It is not soluble in hot water (above 50° C.), nor in alcohol. The directions given by each maker should be followed.

As higher potencies are now used than formerly, and the quantity of serum injected is therefore less, rashes, pain and swelling which sometimes result, are less frequent. Calcium chloride is said to relieve the rash, pain, &c.—Hewlett.

For brief abstracts from the literature on this Antitoxin and notes on **Serum Rashes, Untoward Results and Diphtheria Carriers,** See *Vol. II.*

Diphtheria Endotoxin.—*Dose.*—2 mgr. in 1 Cc. of Normal Saline, up to 5 mgr., for either children or adults after a week or ten days if swabbing still shows *B. Diphtheriæ.*

The cause of the persistence of virulent bacilli in the throat and nose of diphtheria patients long after they appear ready for discharge from quarantine is unknown. The medical treatment of the throat with gargles, etc., and Potassium Iodide given until slight iodism was established is unable to destroy the organisms. Endotoxin was made by Macfayden's washing, centrifugalising and grinding method. The treatment, given while the membrane was still present on the tonsils, resulted in freedom from diphtheria bacilli on the fauces in several cases in ten days to a fortnight from date of injection, whilst ordinary cases of faucial diphtheria are not as a rule free from infection for a month or five weeks after the onset of the attack. In other cases there was a distinct dimunition in the number of bacilli present. The Endotoxin is not intended as a substitute for Diphtheria Antitoxin,—the latter is to be used in the treatment of the case in the ordinary way. Animal experiments show that the Solution in above strength possesses considerable protective power against injections of living *B. Diphtheriæ.* It was found that even after keeping 2½ years the Endotoxin was active. Worthy of trial in persistent diphtheria infections.—R. T. Hewlett and A. T. Nankivell.—L. ii./12,143; L. i./13,1802.

Prophylactic Diphtheria Antitoxin, termed '**M.M.I.**'

E. von Behring at the Congress for Internal Medicine, Wiesbaden, 1913, announced that he had found that a *mixture of diphtheria toxin with the antitoxins* in suitable proportions, when injected into man or animals, forms an amount of immune bodies in the blood, with the result that immunity for a considerable period is established. This prophylactic vaccine may make it possible to vaccinate those in contact with diphtheria contagion with a view to making the immunity last for several months, and to treat disptheria carriers satisfactorily.

It appears that mixtures non-toxic for guinea pigs may in other animals produce marked febrile reaction with the formation of Antitoxin in large quantities. The reaction in man varies with age. The exact dosage of the Antitoxin mixture has yet to be fixed.—B.M.J. i./13,1175.

633 cases of children. As immunising agent by intracutaneous use satisfactory.—D. M. W., 1914, No. I., p. 13.

Diphtheria Bacillus Vaccine has been advocated as an adjuvant to antitoxin in cases where the *B. Diphtheriæ* tends to persist in the throat after convalescence. The initial dose of 25 millions may be repeated in 7 or 8 days; subsequent administrations up to 500 millions are to be controlled by bacteriological examinations of the infected parts. **Ampoules** contain 10, 25, 50 and 100 millions.

An autogenous Vaccine seems to be of definite value in removing membrane, getting rid of nasal discharge, and hence greatly reducing the infectivity of membranous rhinitis, but Vaccine does not appear to be capable of completing the work of elimination after the membrane has gone.—L. i./12,294.

The action of Radium Rays on Diphtheria Toxin has been discussed. See Radium *Vol. II.*

Dysentery.

The Lister Institute supplies **anti-dysentery serum** consisting of the serum of horses which have been immunised against the dysentery bacillus

(Shiga, Kruse, Flexner, Duval, etc., types). It is preserved with Phenol 0·3%; in 20 Cc. vials.

Dose.—Preventive 20 Cc. subcutaneously; curative from 20 Cc. upwards subcutaneously according to severity. For a grave case 50 Cc. In very grave 80–100 Cc. For a child half these doses. Intravenously not more than 50 Cc. at one time. Stools are stated to return to normal rapidly in successful cases, but treatment to be continued. Pains and temporary rashes may result, which need, however, not alarm. Used in three cases with best results, but results are on the whole not convincing.—B.M.J. i./06,680.

In ulcerative colitis, as much as 80 Cc. given in a chronic case in which recovery ensued, but there was much other treatment.—B.M.J. i./09,76.

Keeping Properties. This serum appears to retain its 'toxin'-neutralising power for at least 1½ years, the dry powdered Shiga B. being used as test toxin.—A. T. McConkey, B.M.J. i./17,11.

BACILLARY DYSENTERY. Multivalent Antidysenteric Serum 80 Cc. in the flank in severe or 40 to 60 Cc. for mild cases. In 'fulminating' cases much larger doses assisted by Magnesium Sulphate 1 drachm three times daily for the first few days then reduced amount.

In bad cases Morphine needed and for very severe tenesmus a suppository containing Cocaine ½ grain and idoform 3 grains is useful.

Rectal lavage with 1 in 1000 Copper Sulphate and Mist. Simarubæ often benefits chronic cases. Generally there is distinct rise ln temperature within 12 hours of injection which may last 48 or 72 hours. Good prognostic sign.—J. B. Fisher, B.M.J. i./17,43.

Having formed an opinion on clinical and bacteriological diagnostic grounds that the case is bacillary dysentery, give 100 Cc. antidysenteric serum intravenously without delay followed if necessary by a second dose within 24 hours. In a percentage of cases, however, patients do as well on Saline purgatives.—G. A. Finlayson, B.M.J. i./17,46.

Bacillary dysentery in the Royal Naval Division was found to be more often in the proportion of 8 to 1—due to Flexner's than to Shiga's Bacillus—contrary to the general experience in Gallipoli but the conditions of examination were not strictly comparable. Surg-.Gen. H. D. Rolleston, B.M.J. i./17,258. See also *ibid.* ii./17,539.

Bacillary type of dysentery constituted 95% in the Salonika force—the amœbic less than 3%. Antidysentery serum intravenously 60 to 80 Cc. once or twice daily the first three days gave best results.—D. Graham, L. i./18, 51.

Serum Treatment of Bacillary Dysentery.—B. G. Klein, L. ii./19,775; W. E. Waller, *ibid.* 778.

Bacillary Dysentery.—Med. Res. Com. Report on—reviewed, B.M.J. ii./19 283.

Vaccine B. Dysenteriæ. (Wimpole Institute).

Dose for prophylaxis 250, 500, 1000 mill. at intervals of 7 to 10 days. Initial dose for treatment 100 mill.

For immunisation and treatment, practically atoxic. It is somewhat similar to Gibson's sensitised Anti-Dysentery vaccine and is supplied in ampoules 50, 100, 250, 500 and 1,000 millions.

Production of immunity against Dysentery Toxin. Bacterial Toxins, *e g.*, that of dysentery, slowly lose their toxicity in presence of pepsin. Repeated injection of bacillary emulsion so digested confers a very high degree of immunity. A rabbit which had received 3 injections, received seven days after the last, 20 times the minimum fatal dose of untreated emulsion, without any symptoms whatever. Immunity is produced rapidly,—in six days animals are immune to six times the fatal dose. The method is painless, the animals are not ill and the process is innocuous.—Ruffer. B.M.J. ii./08,1176.

Two cases of chronic dysentery treated with anti-dysenteric vaccine.—L.i./08,1410.

Communication of diarrhœa. History of number of cases suggests that it is a communicable disease, the infection of which is capable of being conveyed to healthy persons in the excrement of the sick.—P.R.S.M., Epid. Sectn. Mar.,'10, p. 111. Infection by flies thought to explain spread of.—Apl.,1910,131.

Summer diarrhœa and infection.—P.R.S.M., Epid. Sectn., Jan., 1910, p. 257.

The relation of flies to summer diarrhœa is practically based on epidemiological and other circumstantial evidence, since the specific cause of this disease has not yet been determined with certainty.—Na., July 21, 1910. *See* also B.M.J. i./13,7.

Directions for preparation of Dysentery Vaccine including experiments demonstrating that the toxicity of an emulsion of B Dysenteriæ can be reduced or entirely destroyed by dilute hypochlorous acid (1 in 1000 dilution of Eusol) or Hydrogen Peroxide and that the injection of an emulsion of this kind in which the toxin has been destroyed produces a satisfactory degree of immunity.—H. R. Dean and R. S. Adamson, B.M.J. i./16,611.

For details concerning differential diagnosis of Bacillary and Amœbic Dysentery and other Bacteriological data see Vol. II.

Endemic Goitre in certain parts of India, is held by McCarrison to be due to intestinal intoxication. He has followed this up by treating patients with Vaccines prepared from mixed cultures of all the coliform organisms grown from the fæces. Initial dose of 150 millions increased at intervals of one or two weeks to 350 or 500 millions. From four to seven injections being required in most cases.—Pr., March '13,595. *See* also B.M.J. ii./14,107, and Therap. Index.

Gonorrhœa.

State Control of Venereal Diseases.—Gonorrhœa accounts for at least three times as many of the annual 500,000 fresh infections with venereal disease as syphilis—legislation must include both—B.M.J. ii./13,372. *See also* p. 953, **Venereal Diseases Act, 1917,** and *Syphilis, Vol. II.*

Gonococcal Vaccine (Wimpole Institute). (*See also* ***Sensitised Vaccines***).—**Ampoules Hypodermic,** are supplied containing 10, 25, 50, 100, 250, 500, and 1,000 million Cocci respectively. '**Neisser Bacterin**' is a similar Vaccine.

In preparing the Vaccine, cultures are taken from cases suffering from a severe first attack only, which has been untreated by antiseptics.

Dose.—In acute urethritis and such complications as prostatitis, vesiculitis, epididymitis, the initial dose is 25 millions, and by judicious use of the vaccine the duration and severity of the disease may be materially shortened. In conjunctivitis and iritis (initial doses 250 millions) and arthritis (initial dose 100 millions) it is stated to be specific. The diagnostic dose in cases of arthritis of doubtful origin is 500 millions (*vide* Streptococcus Rheumaticus vaccine).

A series of injections will certainly free any case of chronic gleet from the gonococcal infection, although it may not succeed in stopping discharge entirely in all cases owing to secondary infections.—R. W. Allen.

Initial doses may be repeated at intervals of 7 days, and gradually increased until a maximum dose of 500 million organisms has been attained. Some cases receive benefit from the injection into the urethra night and morning of an ounce of a liquid culture of Lactic Acid Bacilli, *e.g.*, **Trilactine for Injection**, *q.v.*

A case of a woman who had suffered from multiple arthritis quickly cured by doses of 5 to 10 millions.—L. i./09,1587.

The cases which appear to be most benefited are those of gonococcal septicæmia, including gonorrhœal arthritis and iritis. Friedlander—*Berlin Klin. Woch.*, Sept. 5th, 1910. *Edin. Med. Journ.*, Oct. 1910.—reports good results in acute and sub-acute epididymitis and follicular prostatitis, but not in acute or sub-acute urethritis. Eyre and Stewart, however, recommended vaccine treatment in acute urethritis, and in chronic urethritis where the gonococcus is the only infecting organism present. In acute gonorrhœal urethritis they recommend small doses of 1 to 2 millions repeated at short intervals.

Hale White, P.R.S.M., Oct., 1910, described two cases in which gonorrhœal complications were cured by vaccine treatment.

The injection of gonococcal vaccine usually gives rise to a reaction, which may be local or general. The *local reaction* consists in redness and swelling at the site of injection. The *general reaction* is manifested by a rise of temperature accompanied by increased pain and tenderness in the affected joints (in the case of gonorrhœal arthritis). Both reactions usually subside within twenty-four hours. The reactions are said to be less marked after small than large doses, and to be absent in cases free from gonorrhœa.

It has many points in common with the tuberculin reaction, which may be of diagnostic value also to determine whether a case is cured or not.—C. F. Marshall, M.P.C., Feb. 18, 1911.

In the acute stages of gonorrhœa, provided the disease is localised to the urethra, vaccine treatment is unavailing; the same holds true in almost all cases of uncomplicated chronic urethritis. Gleet resists ordinary treatment because the prostate is the seat of mischief, the place so to speak where the gonococcus lurks, therefore, if this gland is massaged every other day for a minute or so by inserting a finger per rectum all the secretion is squeezed out, consequently if an injection of Silver Nitrate 1 per cent. or Copper Sulphate 5 per cent. be now given, the prostate, acting like a sponge, absorbs the solution, which kills the organisms, and a gleet which has persisted for months or years may not infrequently be cured in a fortnight.

Gonorrhœal arthritis may very quickly go on to suppuration ending in ankylosis. Patients who, having been in bed for weeks with polyarticular arthritis, have been up and about after two injections of Vaccine. Gonococcal vaccine must be fresh, and it seems to matter little whether the Vaccine is made from the patient's own Gonococcus or from stock—most fortunate occurrence, since it is often extremely difficult to obtain a culture from a patient who has no discharge; if such is required the expressed secretion from the prostate after the patient has passed his water to sterilise the urethra, may sometimes yield a pure culture.—J. E. R. MacDonagh. Pr. Nov. '10.

Two cases of gonorrhœal iritis did well. It is interesting to note that gonococci could not be found in the plastic lymph recovered from the anterior chamber of one of these patients, although they could be found in the associated gleet.—Oph., Jan., 1911, p. 68.

Good results in gonorrhœal arthritis and in gonorrhœal vulvo-vaginitis in children.—L. ii./11,1626.

In gonococcal arthritis administration of dead gonococci exerts no curative influence,—it is thought to be valueless as a practical clinical treatment. Results in 9 cases. Theoretically also this authority cannot agree. Increased susceptibility he says is one thing, the power of recovery from it is another, and it is far from certain that the latter can be conferred in all or even many diseases by injecting the corresponding dead bacteria under the skin. The preceding is not a general law. In bovine tuberculosis it has failed. In staphylococcic infection in human medicine there is evidence of curative power. In the case of the gonococcus even the living germs can produce little or no general immunity, and no antibodies are known in man, hence cure by dead organisms is still more unlikely. Diagnostic reaction also varies very much.—Ralph Stockman, B.M.J. ii./11,1466.

Vaccine treatment does not cut short the acute stages of urethritis, but gives good result in gonorrhœal arthritis. Stock Vaccine (polyvalent) practically as good as autogenous.—Majors Pollock and Harrison, B.M.J. ii./12,1143.

Gonorrhœal warts on the face which had resisted ordinary treatment for a year successfully treated with Vaccine.—W. E. M. Armstrong, L. i./13,1382.

Small doses given at short intervals are preferable to large doses at longer intervals.—Pr., July, '13,120.

W. Murrell on the other hand considers auto-vaccines of greater value than those from unknown sources. Surgical ministrations necessary in addition. —Pr., Jan., '12,44.

PUS VACCINE, made by taking about 1 Cc. of pus from the urethra of 21 sufferers, mixing with 10 Cc. of 0·5% Carbolised N. Saline transferred to a 500 Cc. flask and well shaken. Glacial Acetic Acid in the proportion of 0·5% added to the pus cells and the whole well shaken for an hour. The emulsion was then diluted with an equal quantity of Carbolised Saline making 0·25% Acetic Acid and set aside four days to kill the gonococci. The emulsion contained approximately 600 million per Cc. It was tested for sterility and finally diluted so that a dose of 1 Cc. contained 24 million. Scheme of doses used 6, 12, 18, 24, 36, 60, 72, 90, 120 and 150 million at three days' interval. Most patients were cured by the time the 60 to 72 million dose was reached.—E. G. Pineo, L. i./19,508.

Detoxicated Gonococcic Vaccine. (Thomson's).

This vaccine has been submitted to considerable clinical trial (in 150 cases) and it is considered the most logical scientific and effective way of treating gonorrhœa and its complications. Even in doses of 2,500 up to 10,000 mill. no such thing as a negative phase was produced. No other form of vaccine sensitised or otherwise produces such rapid and specific reaction. The vaccine is practically non-toxic. Cases must be treated locally as a surgical condition with vaccine as adjunct and the dose regulated according to serological results. There is less tendency to relapse as the patient has circulating in his blood for several months sufficient antisubstance to protect him. Should be of great value in the female where local treatment is so limited.—D. Lees, L. i./19,1107. (For a general description of Detoxicated Vaccines see p. 909.

Atoxic or Detoxicated Gonococcus Vaccine (Wimpole Institute).

Dose.—Initial 250 mill. repeated or increased in 4–5 days.

This is stated to be an almost identical preparation to that of Captain Thomson above. Ampoules contain 250, 500, 1,000, 2,000 and 5,000 mill.

Worthy of trial in acute gonorrhœa and in its acute complications.

Nicolle's Gonococcus Vaccine. *Syn.* **Dmegon 'Vaccin Antigonococcique Curatif.'**—*Dose.*—2 Cc. repeated 3 or 4 times every 2 days. The Micrococci are killed by special method.—L. ii./13,1153, B.M.J.E. i./14,91.

Hay Fever.—

Hay fever is caused by a soluble toxin which is innocuous to normal individuals. Dunbar showed in hay fever patients the occurrence of some of the reactions associated with the production of immunity,—namely, a specific precipitation of pollen extracts by the patient's serum and the phenomenon of complement deviation during the hay fever season. Pollen toxin is, therefore, a body capable of giving rise to the production of antibodies in animals and even in hay fever patients subjected to its action. Sufferers sometimes become cured spontaneously, *i.e.*, one assumes they have developed an active immunity against the toxin, but more usually they develop a condition of hypersensibility, *i.e.*, becoming more sensitive each successive season. Experiments to determine what degree of immunity can be induced by inoculation of Pollen Toxin were undertaken at St. Mary's Hospital.

The inoculations were made, for obvious reasons, in the autumn, winter and summer, and it was found possible in every case to raise the patient's resistance to doses of the toxin by well regulated dose. An extract was prepared of the pollen of grass by Dunbar's method of extraction with distilled water, aided by freezing and thawing several times. These extracts are boiled for ten minutes after having been sealed in glass tubes. This treatment does not decrease their activity at all. The pollen of *Phleum Pratense, Poa Trivialis, Holcus Lanatus,* and *Agropyrum Caninum,* under test all gave the same reaction when dropped into the eyes of hay fever patients. Timothy grass (*Phleum Pratense*) perhaps yielded the most active extract. One gramme of this Pollen was extracted with 50 Cc. of Water, one drop of a five thousand fold dilution of this extract was sufficient to excite a distinct reaction in the conjunctiva of the most sensitive patients, whilst non-sufferers gave no reaction. A unit of Pollen Toxin was arranged (normal individuals had a resistance 20,000 compared with a sensitive patient 4) and the state of the patient's malady is thus known, and dosage can be calculated. Patients receive subcutaneous injections of, at first, very minute doses of Pollen Extract, at intervals of three or four days, then of a week or so. It was found by the ocular test that this method raised the patient's resistance to hay fever. It is shown that the sensibility of hay fever patients may be decreased by proper dosage at least a hundredfold, while excessive, or too frequent dosage only tends to increase sensibility.—L. i./11,1572.

A subsequent paper gives results of treatment in 20 cases—the majority being 'satisfactory'—improvement, greater freedom from attacks, attack sooner over, etc. The measurement of ophthalmic reaction, employed as test is done by noting the weakest dilution of Pollen Extract, of which 1 drop dropped on the eyeball of patient will just produce a slight flushing of the inner canthus of the eye. The unit of measurement is a 1,000,000 fold dilution of Phleum Pratense Pollen in water,—which is called 1 unit of Pollen, or 1 U.P.,—thus a 100,000 fold dilution of Pollen = 10 U.P., 1,000 fold dilution would equal 1,000 U.P. and so on. The resistance of the ophthalmic test ranged from 5 to 5,000 U.P. and the hypodermic doses from 1 to 2,000 U.P.—given on several occasions (about every week or 10 days) between April and July. In all cases it is seen there is considerable resistance effected by the first dose, as the quantity of toxin tolerated in the eye on the second occasion is greatly increased. It might be argued that prophylactic doses of Pollen Toxin only add poison to an already poisoned system, but the objection is no more valid than objecting to Staphylo. Vaccine to abort boils,—the claim is that though at the seat of the disease the tissues are over poisoned, yet the rest of the body may, under stimulus of an inoculated Vaccine, respond to an increased production of antibodies. Such is the case—immunity is increased

Phleum Pratense appears to be the most potent of all the pollens of the grasses. Apparently this pollen extract will confer immunity against other pollens and conversely.

Initial dose.—A man giving a diagnostic reaction of 6 U.P. would receive 2 U.P. hypodermically, and one who reacted to 100 U.P. would receive 33 U.P.

Subsequent dose.—About every week or ten days—large doses less often, small ones more frequently. The dose should be selected that will give the greatest increase in immunity as measured by the ophthalmo test—within limits. It will probably be safe to inject by 'rule of thumb,' but at any rate to make the diagnosis and fix dose a first ophthalmic test will be necessary. *In general the second and third doses may be half as much again* as the first, while the fourth, fifth and sixth may perhaps be twice as much as the first.—L. ii./11,814. See also L. i./14,1178.

Hay Fever.—5 cases treated with Vaccine. They were all positive on testing with 150 'U.P.'—Distinct benefit.—L. ii./12,1716. See also Pr. 1914, p. 266.

Hay fever treated by prophylactic vaccination with pollen extract as follows.—Initial dose 10 U.P. increased weekly 20, 30, 40, 50, 70, 90, and beyond 100 thus: 150, 200, 300, 400, 500 up to 1000, commencing January in the year.—B.. P. Sormani, L. i./16,348.

Hay Fever Vaccine. Ampoules contain 25, 50, 100, 250, 500 'units.' Immunisation should be commenced in susceptible persons during February with an initial dose of 100 millions:—subsequent doses as above with 7 to 10 days' interval. In treatment the initial dose may be determined by the ophthalmic reaction or failing this give 50 units initially.

A Hay Fever Reaction Outfit is also supplied for determining (*a*) whether a patient is susceptible to pollen toxin, (*b*) the degree of such susceptibility, (*c*) the dosage of pollen vaccine suited to any case.

ANAPHYLAXIS IN HAY FEVER, URTICARIA, AND ASTHMA.—Hay fever forms a good example of anaphylaxis. The attack, instead of conferring immunity, renders the subject still more susceptible to the disease. For a number of years a person may suffer from a series of coryzas to which he does not attach much importance, then one day, when placed in an atmosphere of toxic dust, he suddenly finds himself in the throes of an asthmatic seizure. All people who suffer from hay fever are thought to be victims of anaphylaxis. They have begun with hay coryza and progressed to hay asthma from a special anaphylaxis to pollen and vegetable dusts.

Three conditions are thought essential for the production of hay coryza—1. The existence of a nervous temperament, hereditary or acquired. 2. A hyperexcitability of the nasal mucosa. 3. An external irritant.

Anaphylaxis, hereditary or acquired, also explains a whole series of conditions, viz., those included under the term "arthritism." Urticaria, also, is to be regarded as a sign of anaphylaxis—there is scarcely a neuro-arthritic who has not, at some time in his life, had an attack, the causative irritant varying with the individual. Since antipyrin not infrequently causes urticaria in susceptible persons, Billard has employed this drug as a test of neuro-arthritism, and finds that by administering it he can produce an urticaria in a large number of asthmatic patients. Moreover, urticaria may lead to asthma, just as hay fever leads to hay asthma. Hay coryza may indeed be regarded as an urticaria of the conjunctiva, and of the mucous membrane of the upper respiratory tract.—*Gazette des Hopitaux*, 2nd June, 1910, per Glasgow Med. Jl., Nov., 1910.

Anaphylaxis, *Recent papers on*—W. E. Dixon, B.M.J. ii./13,1351; G. Sims Woodhead, B.M.J. ii./13,1253; F. H. Thiele and D. Embleton, B.M.J. ii./13, 1356; E. W. Goodall, B.M.J. ii./13,1358.

B. Coli associated with hay fever. A case of regular recurrence greatly benefited by Autogenous Vaccine of the *B. Coli* isolated from the pus obtained by washing out the antrum together with Calcium Lactate in large dose.—L. ii./12,1012.

Alterations in the blood during Hay fever.—E. Emrys-Roberts, B M.J. ./14,1176.

Influenza Bacillus Vaccine (Wimpole Inst. *See also Sensitised Vaccines*).

The Vaccine is of service in respiratory disorders due to this organism. It is, however, important to bear in mind that the organism only occasionally occurs alone; frequently it is accompanied by the *Pneumococcus, Streptococcus, M. Catarrhalis,* or *Bordet's Bacillus* of whooping cough. Bacteriological examination is necessary to determine the nature of the infection. Many cases of so-called "Influenza" are due to the *Pneumococcus, Streptococcus* and *M. Catarrhalis* either separately or together and in these cases the **Combined Vaccine for Colds (and Influenza)** is used. In influenzal septicæmia or endocarditis the initial *dose* is 10–25 millions, in true acute influenza 100–250 millions. Chronic influenza, especially if complicated by sinusitis or antral trouble, may persist for years if untreated, and very large doses of vaccine, 1,000 millions or more, may be needed for its cure. **Ampoules** containing 10, 25, 50, 100, 250, 500 and 1,000 millions are prepared.

The Combined Vaccine for Colds (and Influenza) described on p. 846 contains the Influenza Bacillus.

This vaccine has been widely recognised as a prophylactic and therapeutic agent in those susceptible to catarrhs involving the upper and lower respiratory tract. It is practically atoxic and there is no danger in its use in the presence of an epidemic or to those already acutely infected. In treatment the initial dose is 50 millions. For prophylaxis begin with 100 mill. and follow in 7 days with 250 millions and increase up to 1,000 millions.

What is clinically called influenza may be not one disease but a series caused by different microbes, and on the other hand the organisms hitherto described as *Bacillus Influenzæ* are not all identical with it, but belong to a group, the various members of which possess very different pathogenic powers. The presence of an organism conforming in every particular to *Pfeiffer's Bacillus* does not necessarily indicate that there has been an influenzal infection. Each strain of the bacillus may possess different pathogenic powers—in this way somewhat similar to the bacilli of the colon group.—L. ii./10,1289.

The epidemic of so-called influenza in Scotland in the winter 1912–1913 found to be due to either *pneumo-* or *streptococci* by sputum examinations.—J. H. H. Pirie, B.M.J. i./13,1269.

War Office Conference under Chairmanship of Sir W. B. Leishman to formulate recommendations as to Vaccine therapy in Influenza.

Pfeiffer's Bacillus plays a most important part in the production of the symptoms and complications of the disease but the existence of some as yet undiscovered virus may be regarded as possible. Pneumococci and Streptococci are chiefly responsible for the gravity of the secondary pulmonary complications. A **vaccine** was agreed upon containing—*first dose* B. Influenzæ 30 mill., Pneumococcus 100 mill., Streptococcus 40 mill, *second dose* double throughout. Interval 10 days, To be polyvalent and made from organisms isolated in the current epidemic, the vaccine to be sterilised at 55° C. for ½ hour and to contain 0·5% phenol.

Preferable to inoculate men before exposure to infection, but no harm in treating a body of men among whom influenza had already broken out but individuals not to be inoculated who already had fever or at the time suffering from catarrh. Further advice was:—

(a) *Children.* Not advisable to inoculate children under 3 *years of age.*
From 3 to 7 years—¼ of the full doses.
From 7 to 10 years—½ of the full doses.
Above 16 years—full dose.
(b) *Colonial troops.*
First dose—½ the first doses.
Second dose—the full first dose.
Third dose—the full second dose.
(Interval 10 days).

For treatment of severe cases and complications:—

(a) The vaccine is most likely to be of use in subacute and chronic cases Here the initial dose should be 1/5 the first dose above.

(b) For severe cases of secondary broncho- pneumonia the vaccine is not advised but if it is desired to try it give 1/20 the first dose — B.M.J. ii./18,470,494 ; L. ii./18,565.

The content of Influenza Bacillus in this vaccine according to J. Matthews thought far too little. This may be accounted for by a possible change in toxicity in vaccine grown on the author's medium (*vide* L. ii./18,91,104)—the quantity of vaccine required for the military he states can only be grown on it.—L. ii./18,602.

Sir Thos. Horder in support of Matthews finds that the appropriate dose is quite ten times the size of the old growths—possibly due to blood used in the old culture media getting in—the latter gave smart reactions.—L. ii./18,642.

W. H. Wynn agrees and points out that 1000 million B. Influenzæ may confer immunity lasting several months, while that from 30 probably lasts but a few days. He employs 100 million each pneumococci and staphylococci and 50 million B. influenzæ, and after seven days double the amounts—for prophylaxis. For *treatment* 50 million each pneumococci and streptococci and 30 million B. Influenzæ as soon after onset as possible. For broncho-pneumonia the same dose, repeating or even increasing every other day or sometimes daily. 1½ million as advised by the Conference cannot be adequate.—L. ii./18,642. See also Pr., Feb. 1919.

The primary infection in the epidemic thought to be a streptococcus but the 40 million suggested for preventive inoculation thought to be too much.—H. T. Gillett, L. ii./18,643.

Epidemic Catarrhs and Influenza. Résumé on Etiology, Mortality, Preventive Measures and Control. During the spring and throughout the summer of 1918 there was almost constant replenishing of the infection by more virulent infection from U.S.A. and from the continent. (During 1917 and 1918 there were reports of preponderant occurrence of hæmolytic streptococci in the lesions and secretions). The prophylactic use of vaccines to control epidemic catarrhs is doubtful—the prevention of pneumonia is by this means more hopeful.—Sir A. Newsholme, L. ii./18,689.

Pfeiffer's B. is the agent which so markedly lowers the general resistance of the bronchial passages and may thus be the real cause of the disease—there is a possibility however that the presence of an ultra-microscopic organism underlies all the phenomena.—R. Muir & G. Haswell Wilson, B.M.J. i./19,3.

Stock vaccine should be potent. If the cultivation medium does not contain a substance—*e.g.*, fresh human blood—to induce the microbes to produce their specific toxins they lose to a great extent their antigenic efficiency. Further, there is no need to kill by heat—use 0·5% Phenol Saline.—W. M. Crofton, B.M.J. i./19,240.

A large number of patients may in reality be suffering from nasal diphtheria. B. Diphtheriæ found.—E. Marten Payne, B.M.J i./19,7.

Influenza and Pneumonia; prophylactic inoculation by N.Z.E.F. Mixed Catarrhal Vaccine. *Dose* 1. B. Influenza 500 million, Pneumococci and S. hæmolyticus each 250 million. *Dose* 2. Double in each case. Interval 7 to 10 days. No cases of either influenza or pneumonia.—F. L. Armitage, B.M.J. i./19,272.

Medical Research Committee Memorandum on Influenzæ. Work in foreign countries.—L. ii./18,717.

Sputa showed a mixed flora: streptococci, pneumococci, M. Catarrhalis and B. Influenzæ present in high proportion. Vaccine treatment similar to that laid down by the War Office Conference but *M. Catarrhalis added* (25 million for first dose and 50 for the second dose, also Meningococcus 10 million for first and 20 million for second). For *curative* purposes the vaccine was used 1/10 strength. For daily dose or alternate days 1 Cc. containing streptococcus 5, pneumococcus 5, Micrococcus Catarrhalis 5, Meningococcus 2 and B. Influenzæ 2 million.—H. E. Whittingham and C. Sims, L. ii./18,863.

"**Spanish Influenza.**" Pfeiffer's bacillus found exceptionally. Streptococci and pneumococci the most common agents of the complicating pneumonias.—Review of German work in the pandemic, L. ii./18,177.

B.M.A. Discussion. Sir W. Herringham opened same with outline of the epidemic as met in France from its appearance as a mild and transitory fever in May, 1918, spreading with increasing virulence to the July epidemic when pulmonary symptoms first appeared, to be followed by a severe outbreak in September with a mortality of 5%, this—subsiding in January, was followed by a third wave beginning March, 1919, but of less severity and incidence. Nothing approaching a specific has been found though a variety of methods have been tried including vaccines and even the serum of convalescents. Question whether the epidemic is Influenza at all or at any rate whether it has not changed its character. Numerous communications were made. Surgeon Captain P. W. Bassett-Smith said there had been 80,000 cases in the navy in the year. Major Michael Foster found evidence of utility of preventive inoculation extremely slender. Major Tytler found Pfeiffer's B. in 93% of cases working at Boulogne.—B.M.J. i./19,488.

Influenza in India. Some of the earliest cases diagnosed in Bombay occurred on board a transport which reached that port May, 1918. The death rate began to rise in middle of September, and the second wave which reached its crest in October, '18, caused havoc to which the Black Death of 1348-9 alone affords parallel—not fewer than 4,899,000 persons (about 2% of the whole population) died of influenza or its complications in British India, the vast majority within 2 months. Making allowance for the native states not less than 6,000,000 persons perished in India. Indians have a low resistance to pneumonic infection.—Major Norman White, Sanitary Commissioner with the Government of India, B.M.J. i./19,417.

Acute Influenza and Influenzal Broncho-Pneumonia. For an adult man give 80 to 100 million pneumococci, streptococci, and B. Influenzæ; for an adult woman 60 to 80 million, for a child of 12 to 14, 40 to 50 million; for a child of 2 to 3 years, 10 to 20 million. If no response the next dose should be larger, the dose being repeated on alternate days or every day.—These doses are clearly much larger than those recommended by the War Office Conference.—W. H. Wynn, L. ii./18,874. See also this worker's success in prophylactic injection in the 1918 epidemic under Pneumonia.

Filtrable Virus as the cause of early stage of Influenza epidemic, confirming the findings of Nicoll and Lebailly. Experiments on monkeys.—H. Graeme Gibson and co-workers, B.M.J. ii./18,645.

Filter passing virus in Influenza. A Gram-positive coccus, anaerobic, varying in size from 0·15 to 0·5μ. Isolated from the blood in 6 out of 9 cases. It can be grown from blood and exudates and can be found in stained films made from exudates. Has been cultivated.—Sir J. Rose Bradford and co-workers, B.M.J. i./19,128.

In Australia to combat the pandemic the Federal Quarantine Department issued vaccines for prophylaxis and treatment without any apparent controlling influence but it was stated that severe symptoms were modified. Prof. Chapman deprecated their employment.—L. i./19,476.

Preventive Vaccines in U.S.A. employing Influenza 5 *billions*, Pneumococc-Types I. and II. each 3 billions, Type IV., 1 billion, S. Haemolyticus 100 millions.—L. i./19,707.

Aetiology of Influenza.—G. E. Beaumont, L. ii./19,234.

Detoxicated Influenza Vaccine. (Thomson). Used with promising results both prophylactically and as a cure.—D. Lees, L. i./19,1107. For a general description of Detoxicated Vaccines see p. 909.

For further information on B. Influenzæ, vide Vol. II.

Malaria.

For the use of Quinine in treatment of malaria and in prophylaxis against relapses, *vide* Quinine Acid Hydrochloride, p. 669 and Quinine Sulphate p, 673 *See* also Methylene Blue, Atoxyl, Arrhenal, Galyl and Salvarsan; *c.f.*, also Therapeutic Index.

Concerning the combating of malaria by drainage, sanitation, disinfection, etc , and a description of parasites see Vol. II.

Excellent résumé of advice for soldiers and others on prevention of malaria.—C. Christy, L. ii./17,485.

Histology of cases rapidly fatal in the Salonika force in 1916. Examinations of brain, heart, muscle, adrenal glands, kidney, liver, etc.—L. S. Dudgeon & C. Clarke, L. ii./17,153.

Incidence of malaria among our troops in Macedonia, Mesopotamia and East Africa. The operations throughout hampered by high rates of sickness. Lack of precautions based on existing knowledge—canalization, adequate use of tents, etc. A condemnation of the military side of the matter.—B.M.J. i./18,350.

Malaria, 12,000 cases in Macedonia treated by A. C. Alport (Review).—B.M.J. ii./19, 467. Thyroid gland enlargement in malaria.—J. B. Hume, B.M.J. ii./19,661.

Ozæna Vaccine.—*Initial dose* 50 to 100 millions increased to 250, 500, 1,000 and 2,000 millions if necessary with seven day intervals.

B. Ozœnæ is found in cases of early atrophic rhinitis and autogenous Vaccines of it combined with other organisms present *e.g.*, *Streptococcus, Pneumococcus, Staphylococcus Aureus* and *M. Catarrhalis* have been given.—Abel, Page and others.

Pneumonia.

Sources of the Pneumococcus and Modes of Infection.—It is uncertain whether pneumonia is caused by infection from dried sputum containing pneumococci or by auto-infection from the germ so commonly present in the throat in health.—The hæmatogenous mode of infection offers the best explanation.—L. ii./12,1791.

As the result of research and clinical experience, R. W. Allen considers that it is not the pneumococci of the throat but those resident in the lower lobes of the lungs of so many of the population at foci described in his Practical Vaccine Therapy (pp. 62, 93, 100, 125, 163), which are to be held responsible for nearly every case of sporadic pneumonia in the adult. It has been shown at the Rockefeller Institute that the throat organisms and those of the sputum of a case of pneumonia may be and very often are of different types. The pneumococci of these foci almost invariably correspond in type with the pneumococci of the sputum if and when the ‘ carrier ’ incurs a pneumonic attack.

Pneumococcal Vaccine (WIMPOLE INST. *See* also ***Sensitised Vaccines***). **Ampoules** for Hypodermic use contain 25, 50, 100, 250, 500 and 1,000 million organisms in each.

This Vaccine, besides being of undoubted service in pneumonia when it should be given as early as possible in the attack is also employed in the treatment of empyema, especially in children (in adults, combination with a streptococcal vaccine may be advisable), in nasal and laryngeal catarrh, asthma and bronchitis, periostitis, otitis, endometritis, and pyosalpinx, where initial doses of 100 millions may be employed, when due to this organism.

Dose.—25 millions initially is repeated or increased at intervals of seven days, according to clinical symptoms. Cases of delayed resolution in pneumonia are benefited by injections of 50 to 100 millions every 8–10 days, while routine treatment of all cases of pneumonia during the first week by doses of 25–50 millions whenever there is a rise in the temperature has been much practised of late. In pneumococcal eye infections an initial dose of 250 millions is appropriate, and in pneumococcal septicæmia 10–25 millions.

In pneumonia, R. W. Allen, Jl. Vaccine Therapy., Jan., 1913, advises if no definite response within 36 to 48 hours from 25 millions to repeat the dose of stock vaccine, or preferably of autogenous vaccine if ready. If still no response give 50 millions in 36 to 48 hrs.; if response, as evidenced by improved clinical signs and symptoms and increased well-being of the patient, defer re-inoculation three days, or until the first signs of retrogression in the general condition or clinical signs and symptoms. Maintain dosage or even increase it, and continue inoculations at intervals of three to four days, until the patient is perfectly well. If the patient at any time takes a sudden turn for the worse, search for such complications as may require surgical interference. It may be advisable in such conditions to suspend specific treatment, but immediate re-inoculation, perhaps with an increased dosage, may be more likely to be productive of good. Use every known means throughout of securing toxic elimination, of sparing the heart from needless strain, and of tiding it over the period of greatest stress.

It is highly probable that a considerable percentage of failures with stock vaccines in the past has been due to the vaccine not conforming in type with the infecting organism. Stock vaccines must be highly polyvalent and polyvalent in each of the types peculiar to the country. The use of autogenous vaccine is clearly preferable.

The percentage of cases of pneumonia due to bacteria other than pneumococcus is probably very much greater than is supposed. This has been verified by the experience of the wide spread epidemics in 1918–19 of so-called 'Spanish flu.' In cases **where pneumonia is said to supervene upon influenza**, the infection is a double one from the beginning, and much may be done to prevent the pneumonic attack by giving 25–50 million doses of Pneumococcal Vaccine, combined with 50–100 millions of *B. Influenzæ*, as early as possible during the influenzal attack.

Prophylactic Inoculation. It will be recalled that Sir A. E. Wright in his Witwatersrand Report, L. i./14,187 ; L. ii./12,1633, 1701, advise as the optimum prophylactic dose 1,000 million for the natives and that they should be re-inoculated after expiry of four months. He found, however, that doses up to 40,000 million produced nothing more than a slight constitutional disturbance and slight rise in temperature. Lister found the natives possess an extraordinary susceptibility to the penumococcus and that they require high doses for immunisation. He advises a vaccine of four types containing 6,000 millions per Cc. of each type making a total of 24,000 million per Cc. Of this 1 Cc. is given as initial dose twice repeated at intervals of 7 days. Borel holds similar views and he inoculated Senegalese troops in France with initial doses of 32,000 million without ill effect.

For white races work of investigators of the Rockefeller Institute shows that initial doses of 1,000 million of each of the prevalent strains can be safely used and that with lower doses full immunity may not be secured. After 7 days either 1,000 or 2,000 million is given and a further 2,000 million 7 or 14 days later. R. W. Allen considers that 2,000 millions of the types common to this country twice repeated at 10 to 14 days' interval give good immunity to healthy subjects (free from pneumococcic infection of the lungs) for at least six months. For consideration of this subject see 'Practical Vaccine Therapy' page 100 *et seq.* If an atoxic or *detoxicated vaccine* is used this dose should be doubled or trebled.

Types of Pneumococci. Work at the Rockefeller Hospital divided 454 cases of lobar pneumonia into 4 types. Type I. was responsible for 33%, Type II. for 29, Type III. for 13 and Type IV. for 20. (The strain found among the blacks on the Rand appears to be Type IV. F. S. Lister has in addition to these separated 4 additional types in S. Africa.) Type IV. predominates in the pneumococci found in the mouths of 50% or more of normal persons. For a digest of recent American work see B.M.J. i./18,57.

F. S. Lister now refers to about a dozen types of which A, B and C are responsible for 60% of cases in S. Africa. 'A' group is predominant in the Transvaal natives. It is not seen in America. 'B' and 'C' = the American II. and I. These latter are the most important in the etiology of lobar pneumonia. A prophylactic vaccine of 'A,' 'B' and 'C' was encouraging. Types 'E,' 'H,' 'J' and 'K' might well be included.—B.M.J. i./18,351.

Double pneumonia after childbirth,—gradual convalescence and recovery on use of Vaccine. Patient desperately ill until 48 hours after the injection, when she rallied.—L. i./09,1454.

Methods of taking material for examination. Near the crisis there is usually definite rise in opsonic power. Temperature often falls and dyspnoea and delirium decrease at once on treatment. Cases running protracted course greatly benefited. A Vaccine from a virulent strain probably more useful than an autogenous one.—B.M.J. ii./09,1050; L.ii./09,471.

Pneumococcal cystitis and arthritis successfully treated by vaccine from patient's organism.—L. i./09,1457.

Abscess of the appendix treated by pneumococcal vaccine.—B.M.J. i./09,1054.

Autogenous pneumococcic vaccines. Cases treated with success—initial dose being 50 millions. Often arrests the condition within 12 hours. Should be given as early as possible.—B.M.J. i./09,1530.

Sir A. E. Wright stated that he had been a sufferer from chronic bronchitis for 30 years, which cleared away entirely after a few doses of his own pneumococci.—L. ii./09,472.

Acute infective endocarditis—Fraenkel's organism isolated from patient's blood removed from a vein. Initial dose 50 millions and further doses of 50 and 100 millions—this case is believed to be the first of its kind placed on record. A fairly large volume (10 Cc. at least) of blood should be taken for culture.—Pr., Aug., '09,203.

Eight injections of Vaccine in increasing doses, at 5 or 6 days interval, contributed to the successful issue of a case.—B.M.J. i./09,651.

Pneumonia—cases well treated with Vaccine.—L. i./12,575,646.

In acute lobar pneumonia extreme caution is necessary in using a Vaccine—it does not seem to arrest the disease but often lowers resistance to the pneumococcus.—Athole Ross, Pr., July, '13,108.

Acute pneumococcal tonsillitis treated by stock Vaccine and autogenous with success. Temperature and swelling in the throat reduced.—S. P. Shivdas, L. ii./12,1149.

No person is more liable to become the victim of acute pneumonia than the chronic alcoholic, nor is any person so difficult to treat during the illness or so likely to succumb. Often hearty-looking and ruddy-faced, he makes the poorest stand against the profound toxæmia produced by the pneumococcus.

Prophylactic injections in the 1918 epidemic given to 230 persons, 100 million pneumococci and streptococci and 50 million B. Influenzæ being the first dose and after a week double these doses to 90 of them. The remaining 140 had equal numbers of each organism. In some a third dose of 400 million and in a few 800 million was given. At an Institution 112 of the staff were inoculated twice leaving a balance of 53 not treated. Of the 112 two only had mild attacks; of the 53, 25 had mild attacks in June and escaped in the latter epidemic; one had a mild attack in February and subsequently severe broncho-pneumonia, 14 of the remainder escaped in the earlier part of the epidemic but contracted influenza later, two with severe broncho-pneumonia and one dying These small doses give clearly some measure of protection —W. H. Wynn, L. i./18,874. See also this worker's recommendations in treatment of acute influenza and influenzal broncho-pnuemonia under Influenza.

Anti-pneumococcic Serum.—*Dose,* 20 to 30 Cc. into the lumbar or gluteal region as early as possible, repeated the following day, or until temperature falls.

Endocarditis treated with anti-pneumococcic serum.—L.i./05,1338.

Type I. Pneumococcic Serum.

As the types of pneumococci (see p. 870) have in general a high degree of specificity a homologous serum is necessary The immune serum against Type I. is of great therapeutic value but those corresponding to Type II. and others have not yet proved effective —they only contain a very low content of antibodies. The use of serum should therefore be confined to cases proved to be of Type I. For details of manufacture of this serum see Cole & Moore, Jl. Exp. Med., Baltimore, 1917, XXVI., 537–561, also other references per B.M.J. i./18,58. A dose of 90 to 100 Cc. of the serum repeated eight-hourly unless contraindicated till at least 250 Cc. have been given is advised by these American workers. They advise also a preliminary intradermal test to remove all risk of grave consequence from anaphylaxis. If there is any indication of its existence the use of very small doses (initial 0·025 Cc.) intravenously slowly injected is recommended every half-hour, doubling the dose each time until 25 Cc. have been given. Results with Type I. serum were satisfactory. 63 American soldiers were treated with mortality of 8%. Among the uninoculated the mortality was 39%.

Pane and Renzi's Antipneumococcic Serum.

Supplied in two strengths, Nos. 1 and 2.

Dose.—15 Cc. of No. 1 repeated, if necessary, in 24 hours, is of value, especially in severe cases with high temperature and rapid pulse. Improves tone of pulse where there is great heart weakness. The toxin secreted by the coccus appears to act on the muscles of the heart and weakens it.

Site of Injection.—Subcutaneous tissue of the abdomen.

If patient very weak the Serum may be given per rectum—the bowel being previously washed out by an enema of warm salt solution.

Diagnosis.—In suspected cases examine the fauces for pneumococci. The use of antiseptic gargles may check further infection.—Pres., July, '08,131.

Pneumococcal Meningitis treated by Pane's Antipneumococcic Serum *per os.* 5 Cc. doses *mane,* no food being given for two hours before or two hours after. Dose *per os* double that necessary hypodermically. Lumbar puncture simplified by Eucaine and Adrenalin hypodermically.—W. Broadbent, B.M.J. ii./16,586.

Pyorrhœa Alveolaris.—It is probable that in very early cases of pyorrhœa alveolaris the bacteriology of the condition may be a relatively simple one, *Streptococci*, *Pneumococci*, *Staphylococci* and *M. Catarrhalis* alone or in combination being probably causes, —later on, however, secondary infection by spirochetes, streptothrices and vibrios inevitably occurs and these may entirely replace the original invaders. Observations in S. Africa, America and the South Sea Islands have shown that **Vincent's Fusiform Bacillus** alone may be responsible for most intractable ulcers, while cultures of the above organisms in liquid media are intensely toxic; the view, therefore, that they may be responsible not only for the local but also for the general toxic symptoms in advanced cases of pyorrhœa is more than justified.

Pyorrhœa Vaccine containing the *Streptococci* and *M. Catarrhalis,* and the *Spirochætes* and *Streptothrices* in small doses is used. A Vaccine of this kind is supplied in doses of 25, 50, 100, 250 and 500 million.

An **atoxic** or **detoxicated vaccine** of the several organisms is also available in doses of 200, 250, 500, 1,000 and 2,000 million, and is worthy of trial, as in it are included full dose of the spirochetes and streptothrices which in other forms are too toxic to use. Emetine has been employed in treatment. *See* pp. 515, 516.

A description of the bacteriology of a large variety of organisms found in pyorrhoea alveolaris. Opsonic Index estimations were made. It was found that a low index was shown to certain bacteria taken from the mouth in cases having some form of constitutional disturbance, *e.g.*, toxæmia, anæmia, various forms of gastric and intestinal indigestion. Injections of Vaccine—Kenneth Goadby.—L. i./07,633; 819; ii./07,1818.

An Emulsion of Sublimed Sulphur in Glycerin used to cleanse the mouth and gums in cases treated by Serum and Vaccines. It had marked effect on the local inflammation and pain.—Kenneth Goadby, B.M.J. ii./08,477.

The Bacteriology of pyorrhœa alveolaris. Vaccine treatment (Autogenous)—P.R.S.M., Dec., '09, Odontology Sect., p. 29.

Streptococcus Salivarius normally in the mouth is harmless, but may be pathogenic, as in pyorrhœa alveolaris.—B.M.J. i./11,693.

Entamœba buccalis has been stated to be responsible for pyorrhoea (Barrett of America and Chiavaro of Italy). Amœba in the mouth have been observed by many since 1849. Entamœba Buccalis is 6 to 30 micromillimetres in diameter, lively in motility, poor in chromatin, with a thick membrane. It has been found by Barrett in nearly every pyorrhoea pocket examined.—J. S. White, P.J. i./15,797.

Parodontal Streptococcus Vaccine is also for use in pyorrhœa alveolaris, dental abscess, in treatment of small blisters and ulcers of the mucous membrane of tongue, cheek and lips, also in pyorrhœic rheumatism. *Medium Dose.*—6 to 10 millions.

Relapsing Fever.—See *Vol. II.*, also Salvarsan chapter.

Rheumatism.

Pathogenesis and Treatment of Rheumatic Fever (and Chorea).

Rheumatic Fever—an acute specific disease. *Diplococcus Rheumaticus,*—an organism found by Pointon and Paine growing in short chains, Gram +, forms Lactic, Formic, and Acetic Acids and curdles milk—is the cause of the disease. The organism has a strong vitality on Blood Agar. It may be shown in all rheumatic lesions, though with difficulty. There is a close relation between chorea and rheumatism—the same organism may be responsible for both. Results with a Vaccine in two cases on the endocarditis. Charts showing rapid subsidence of fever in all cases. Similar results in acute rheumatism with pericarditis, chorea and endocarditis.—R. M. J. Buchanan, Jl. Vaccine Therapy, Vol. I., No. 1, Jan. 1912.

The organism produces ½ Gm. of Formic Acid (also Acetic Acid) from a litre of culture. The urine of rheumatic patients contains up to 0·2 Gm. in a day's urine. Salicylates administered decrease the amount. This acid is not known to be produced in like amount by streptococci from other sources; —B.M.J. i./07,1233. See also Pr., Feb., '09,250.

Streptococcus Rheumaticus Vaccine (Wimpole Institute) for complications of rheumatic fever. *Initial dose* 5 to 10 millions.

In doubtful cases of rheumatic arthritis a dose of 250 to 500 millions of *Streptococcus Rheumaticus* may be given diagnostically, and the temperature observed every four hours for 24 hours; a marked temperature or local reaction will assist greatly in establishing the diagnosis. **Ampoules** containing doses of 5, 10, 25, 50, 100, and 250 millions are prepared.

Rheumatoid arthritis treated satisfactorily with doses of 5 millions subcutaneously every two or three days.—B.M.J. i./11,192.

The association of disease of the mouth with rheumatoid arthritis and certain other forms of rheumatism. In diseases of the jaws, especially rarefying alveolar osteitis a strepto-bacillus was isolated. Pure Cultures inoculated into or around the knee joints of rabbits produced symptoms like arthritis deformans. Treatment of cases by autogenous Vaccines made from the organism effected amelioration and disappearance of the symptoms in a number of cases. Initial dose was 10 millions, subsequently 150 and 200 millions. First given at periods of ten days, then at fortnightly intervals for six months, and afterwards at intervals of six weeks for a year. There was generally increase of arthritic pain and swelling by the first injection. It is better to reduce the initial dose to avoid this exacerbation.—Sir Kenneth Goadby, L. i./11,639.

Neutral Red Egg Medium (Fleming's) is used for cultivating the organism from the urine. Extreme caution in the use of this Vaccine is necessary. Even 500,000 may cause a most unpleasant reaction and until the urine is free from organisms more than 5 million can seldom be given.

Distinguish from Staphylococcic Vaccines. The organism disappeared from the urine as improvement with Vaccine was effected.—H. Warren Crowe.—L. i./13,1377; A. Bertram Soltau, *ibid*, 1379.

Subacute rheumatoid arthritis well treated.—B.M.J. ii./10,1918.

Rheumatoid arthritis, a case in which vaccine therapy did no good but balneotherapy and massage improved.—P.R.S.M., Diseases of Children, Sect., Dec., '10, p. 33 *et seq.*

Inoculation with *calf vaccine* has marked effect on the pain and frequently good action on the affection itself.—Pres., Jan., 1911, p. 6.

In the treatment of blennorrhagic arthritis when all other treatment has failed, 3 to 5 Cc. of the synovial fluid is withdrawn and reinjected under the skin of the articulation. This process may be repeated every two or three days. The same procedure gives equally encouraging results in hydroarthroses of all kinds.—L. ii./11,1437.

Rheumatism in childhood.—If Vaccines have the wonderful powers that some would lead us to believe and can influence the mysterious processes of disease with such certainty, and almost with such monotonous regularity, then they must also possess a decided power for harm if wrongly used. Initial doses should be small. Commence with one million and doubling each dose test each advance *by the occurrence of any reaction,* which demands *immediate* caution. Good result has undoubtedly followed in some cases, but equally disappointing ones with others.—F. J. Poynton, Pr., Feb., 1913,416.

Chronic arthritis. Streptococcal Infection is frequently concerned in chronic arthritis. 20 cases treated by Vaccines of Streptococci derived from various sources—either from the mouth in cases of oral sepsis (gums), from the urine or from the fæces (*S. fœcalis*). Six of the cases much improved, six showed some improvement, six unchanged.—D. W. Carmalt Jones, B.M.J. i./13,1047.

Experimental rheumatism. Rabbits inoculated with Streptococci recovered from cases of rheumatic infection have developed arthritis, carditis, and other lesions. The lesions of human clinical rheumatic infection were reproduced in essential details in the rabbits by inoculation from patients suffering from rheumatic infection.—Differences in the histology of experimental and human rheumatism. —L. ii./12,1209,1394,1461,1539,1610,1678,1791.

Using cultures of *M. rheumaticus* (of Poynton and Parnet Beattie) Ralph Stockman was unable to produce in animals symptoms of lesions of rheumatic fever. Certain Vaccines likewise of the skilled organisms failed him in patients suffering from rheumatism.—B.M.J. i./13,597. We provide further abstracts of this paper under Salicylates, p. 84.

Septicæmia, Anti-Streptococcic Serum.

Dose.—30 Cc. early in any form of septicæmia, and repeated the same day and daily afterwards. Injections should be made at the seat of inflammation, &c., if any, as in erysipelas, so as to produce good local effect. Usually supplied in 10 Cc. phials.

Special Anti-streptococcic Sera for use in **Erysipelas, Puerperal Fever, Scarlatina, Endocarditis and Rheumatic Fever**, are obtainable. It is an anti-bacterial serum, and should be recently prepared;

In manufacture the virulence of the *Streptococcus* is increased by passage through a succession of animals. Finally a dose of 100 to 200 Cc. is reached The horse is bled and the serum standardised

Uses and References.

Puerperal fever and the varied forms of septicæmic infection following childbirth have been treated in many instances with it with good results.

It has been advised that a few doses of 10 Cc. should be given as **prophylatic** before operations on the mouth and throat.

Indicated in simple septicæmia or sapræmia. Erysipelas, endocarditis, carbuncle and acute rheumatism have been treated with it.

Streptococcic infection (or mixed Strepto. and Staphylo.) in sore throat best treated by 5—10 Cc. combined with swabbing with a solution containing 10 grains of a powder composed of equal parts of Sodium Bicarbonate, Sodium Chloride and Potassium Chlorate in an ounce of water. This solution will dissolve the membrane in question.—B.M.J. ii./09,196.

For a number of older references *vide* previous Editions

Streptococcic Vaccine, (*see also* **Sensitised Vaccines**), may be employed in localised infections, as erysipelas, lymphangitis, ulcers, sinuses, tonsillitis, adenitis and mastitis ; also in asthma and bronchitis, and in generalised infections such as septicæmia and pyæmia, provided always that for these pathological conditions the Streptococcus has been proved to be responsible. *Initial dose* in very acute and in generalised infections should be 10 or at the most 25 millions ; in more chronic conditions a dose of 25 to 50 millions is suitable. **Ampoules** for Hypodermic use are supplied containing 10, 25, 50, 100, 250 and 500 millions respectively.

An atoxic variety of this Vaccine is also supplied in doses of 100 to 2,000 millions.

Streptococcus Conglomeratus Vaccine is prepared for the complications of **scarlet fever.** *Initial dose* 10 millions.

In view of the fact that the Anti-streptococcic Serum has been a failure in a large number of cases of erysipelas, pyæmia, etc., and recognising that the streptococcus is a very large genus—it may be desirable to prepare an autogenous vaccine.

A case of septic endocarditis successfully treated by inoculations of a vaccine prepared by Prof. Wright from a pure culture of streptococcus obtained from patient's blood.—L. i./07,501.

Hepatic abscess discharging externally cured by Vaccine made from the *Streptococcus pyogenes longus* obtained from the pus. Initial dose 10 millions—gradually increased.—B.M.J. ii./08,1730.

Streptococcus lanceolatus Vaccine employed in a case of an old man with empyema. Injections of 5 to 50 millions. Improvement—expectoration ceased, temperature became normal, gained weight, etc.—B.M.J. ii./08,1735.

Transient multiple arthritis apparently caused by injection of 25 million dead Mixed Streptococcus by mistake in the course of treatment of pyelitis. Recovery under Sodium Salicylate.—B.M.J. ii./09,142.

Erysipelas.—The routine dose is 2 millions Streptococci every 4 days. Results are remarkably good.—Sir A. E. Wright, L. ii./08,731.

Erysipelas.—Diagnosis can be based on the 'spread of the erythema from a local focus,—true inflammation of the epidermis with exudation of leucocytes,—not merely a transitory erythema due to vascular dilatation, as occurs in cellulitis and lymphangitis.' It is caused by one of the organisms of the Streptococcus class.—*Streptococcus pyogenes* being most frequent.—L. ii./09, 1070.

Foul breath. Case of bacterial infection of the stomach well cured by a Vaccine prepared from patient's organisms, a combination of Streptococcus from the urine and B. Coli from the stomach—four injections were given at intervals of one week, the range of doses being Strepto and Coli of each 5 increasing to 20 of each. B. Coli is usually found in the stomach in obstruction of the pylorus due to malignant disease. No previous case recorded by an infection of the stomach by this organism with normal gastric motility—M.P.C. ii./11,528; B.M.J. ii./11,1593.

Malignant endocarditis, a case of, treated with an autogenous Vaccine (Streptococci isolated from the blood) showing disappearance of the infecting organisms from the blood within twelve months, together with marked improvement in clinical symptoms. The Vaccines were given in 10 Cc. of Normal Saline by the mouth in an empty stomach.—A. Latham and E. L. Hunt, P.R.S.M., Clin. Sectn.

Combined treatment with Autogenous Vaccine and *Autogenous Serum* may eventually become the standard treatment in infective endocarditis (Streptococcal). An extremely grave case is described in which Autogenous Streptococcal Vaccine was pushed up to 15 millions and a special Serum employed by injection and *per os* (25 Cc. doses). The combined effect may have been similar to that in Sensitised Vaccines. The Streptococcus obtained from the blood was S. Salivarius, almost proving its origin from a tooth abscess from which the patient suffered.—Henry Hemsted, L. i./13,13.

Autogenous Vaccine in cellulitis. An incision is made under local anæsthesia into the primary focus, an agar slope is inoculated and a Vaccine prepared. The Vaccine is usually a mixed one consisting of *Streptococci* and *Staphylococci*. A first dose of 200 millions increased in some cases to 1,000 millions. The trouble necessary is justified by results.—B. Hughes, Pr., July, 1912.

Puerperal infection.—Good results with Autogenous Strepto. Puerperalis Vaccine. Other cases of mixed infection, *e.g.*, Streptococcus and Diphtheroid Bacillus, Streptococcus and B. Coli, etc. Suggestion to immunise a woman before confinement by an injection of a Strepto. Puerperalis Vaccine.—J. F. Jordan, B.M.J. ii./12,1.

The mortality amongst notified cases of puerperal fever it is stated is about 60%. This may be reduced to about 30% by treatment with Autogenous Vaccines.—Pr., July, '13,113.

Septic sores and Nile boils well treated with Streptococcic Vaccine in the former and Staphylococcic in the latter.—H. Warren Crowe, L. ii./18,667.

Staphylococcal Vaccine (*S. albus* and *S. aureus,* also *Mixed* Vaccine—*S. Albus* and *S. Aureus* in equal proportion. *See also*

Sensitised Vaccines. WIMPOLE INSTITUTE. *Dose.*—Initial 100 millions, increased to 1,000 or even 5,000 millions.

An '**Atoxic**' variety of this Vaccine is also made in doses of 250 to 5,000 millions and is suggested where cases do not respond to the ordinary vaccine as in some cases of acne, Nile boils and furunculosis.

In cases of acne, *Staphylococcus albus* is commonly associated with the Acne Bacillus (*q.v.*). In boils, carbuncles, sycosis, ulcers, and sinuses generally, and in acute generalised infections, such as pyæmia, ulcerative endocarditis, septicæmia, and peritonitis, either *S. Albus* or *S. aureus* may be found, but the *S. aureus* is relatively the more common. The mixed vaccine may if necessary be used.

A carbuncle is less easy to cure than boils because the blood cannot be brought into effective contact with the germs. **Administer Citric Acid internally** to diminish its coagubility and **apply locally a solution of Salt and Sodium Citrate** to decalcify the lymph.—Sir A. E. Wright, L. ii./08,730.

Acne of the type with much oily seborrhœa and comedones abundant, inoculation treatment with Staphylococcal Vaccine alone not of much value. According to Whitfield the comedo is not Staphylococcic in origin, but due to the growth of a micro-bacillus in the neck of the pilo-sebaceous follicle.

Boils, in nine cases out of ten, 100 million Staphylococci will cure.—Sir A. E. Wright, L. ii./08,732.

Eczema, acute, when the suppuration is not controllable by ordinary means and the stage of "chronic" pus infection is reached, Vaccine Therapy used with good effect.—B.M.J. i./09,1342. Pr. '09,657; L. i./12,232.

In acute mastitis Vaccine of the two main infecting organisms, viz., *Streptococcus* of one variety or another, and *Staphylococcus Aureus* was of value.—the latter is the more common organism.—B.M.J. i./11,865.

Ulcerative endocarditis in a baby with pyæmic abscesses cured by drainage and Vaccine (Staphylococcus Albus). 2½ million being injected once a week for two months, then gradually decreasing the dose to ½ million. The improvement in the infecting knee joint was excellent,—prognosis looked extremely bad.—B.M.J. ii./10,1772.

Furunculosis. If no improvement after three or four injections make an autogenous vaccine.—Athole Ross Pr., July, '13,100.

With regard to staphylo. infections, in 1903 the opsonic index told us the proper dose was 2500—5000 million staphylococci to cure, but in 1908 it was reduced to 100-250 millions. Have we any reliable means of knowing the proper dose of a vaccine? Disappointments in vaccine therapy.—H. G. Adamson, L. ii./18,172.

Tetanus.

Amyl Nitrite in capsules is valuable for checking the dangerous spasms of the glottis and respiratory muscles.

Oxidising Antiseptics, for example Hydrogen Peroxide, Potassium Permanganate, Chlorine water and Iodine Solution are particularly unfavourable to the anaerobic growth of the organisms. They have the power of rendering toxin non-toxic, but *there is no evidence that Phenol* (Bacelli's method) *or Magnesium Sulphate injections* (*vide* p. 531), *have any effect on the course of the disease.*—W. O. Memorandum on Tetanus, B.M.J. ii./16,647,660.

Iodine injected subcutaneously can be of no value alone against Tetanus. Colloidal Iodine also unavailing.—B.M.J. i./16,411.

Bacelli Method used with success: 2 patients received 1% Phenol injections 40 Cc. daily, increased to 70 Cc. and then diminishing. Two others received 6 Cc. Colloidal Rhodium in addition intravenously. All recovered in 15 to 20 days.—Report from Monte Carlo, C.D., Noc., 21/14.

Magnesium Sulphate intraspinally. Bacelli's Carbolic Injections, Chloral, etc., unsuccessful, death being the result in every case.—B.M.J. i./16,620.

Oxygen Injections delayed death of guinea-pigs inoculated with fresh bouillon and agar cultures of B. Tetani. Suggested for treatment.—H. O. Howitt, and D. H. Jones, L. i./15,752.

Magnesium Sulphate Injections. Subcutaneously not more than 2 Cc. or less than 1·2 Cc. of 25% solution per kilo of body weight four times in 24 hours. Ether inhalation increases efficiency: this is used in conjunction with intramuscular injection.—S. J. Meltzer, L. i./15,1330.

Delirium following injections of 1 Cc. of 1 in 20 Carbolic Acid used in conjunction with Antitetanic Serum. Ultimate recovery under sedatives.—J. Everidge, B.M.J. i./16,443.

Bromide and Chloral may be necessary, and large doses of fluid are advised.

Tetanus Antitoxin.

The **Lister Institute** advises as follows:—

(1) ***In an actual case of Tetanus.*** At first sign of tetanus give very large doses energetically and continuously—3,000 to 8,000 U.S.A. units beneath the spinal arachnoid (in the usual position for lumbar puncture) and 9,000 to 16,000 units intravenously. Before the intravenous injection, however, inquire whether patient has any idiosyncracy such as liability to attacks of asthma, to be effected by emanation from horses, etc. Then give a further 10,000 units partly *intramuscularly* and *partly subcutaneously.* If the patient is worse at the end of 18 hours repeat the intraspinal dose daily for three or four days—also the intravenous and intramuscular doses if required. It is better to give too much than too little. On improvement give 1,500 to 4,000 units subcutaneously twice daily for several days. Diminish the treatment gradually *until fear of relapse is gone.*

Warm the serum first to 99 *or* 100° *F. before injecting.*

After the first intraspinal injection there may be increase in symptoms. Rise in temperature with rashes which should pass off.

Wherever possible give intraspinally in addition to intravenously and intramuscularly. Experience shows, however, that Prophylactic use is best.

(2) ***Premonitory Symptoms.***

General restlessness suddenly changing to a desire for rest occurring a day or two after infection.

Unreasonable outbursts of temper. Increased nervousness.

Sleeplessness with distressing dreams and maybe nightly delirium.

Temporary giddiness, violent headache, excessive yawning, diffuse backache.

Trembling of the tongue which is put out to one side, also unilateral palate trouble.

Some local swelling, without redness, of the injured member and throbbing of its arteries notwithstanding that the limb is raised.

Slight jerking may follow pressure on the flexor tendons and the muscles may be noticed to be in a condition of increased irritability.

A profuse, peculiar smelling sweat and darting pain in various parts often occurs.

Difficulty in micturition, due to spasm of the sphincter vesicæ, which may last from a few minutes to half an hour.

Changes in the facial appearance, the patient *looks* anxious, though there is as yet no *risus sardonicus.*

The following symptoms may occur later:—

Increased flow of saliva.

Nystagmus, strabismus, ear ache. Spasmodic cough.

Stiffness at angle of jaw. Difficulty in swallowing. Tremors and clonic spasms which are not painful and may not attract attention. Pain persisting after muscular contraction induced by effort.

(3) *Prophylactic Use of Antitoxin and Treatment of Wound.*

Dose.—At least 500 U.S.A. units to be given *under the skin of abdomen or flank* in every case of injury where possibility of B. Tetani infection. If there is much soiling of the wound or if 48 hours have elapsed 1000 to 1500 units. A further dose of 500 units in a week.

Use Iodine in the local treatment of the wound as it has strong destructive action on Tetanus Toxin.

If there is much dead tissue in a wound which is several days old or if much soiled with dirt give 1,000 to 1,500 units *intramuscularly* if possible 3 to 4 hours before cleaning or scraping the wound.

Intramuscular injections are preferably given in the outer side of the thigh (into the body of the vastus externus muscle).

U.S IX. has in addition to **Serum Antitetanicum** a **Serum Antitetanicum Purificatum.** This latter is a solution in normal saline of the antitoxin-bearing globulins separated from other constituents of the serum. Both of these have potency not less than 100 units per Cc.

Dried Antitetanic Serum U.S. is made by evaporating either in vacuo over a desiccating agent or by passing over it a current of warm air freed from bacteria. Potency not less than 1,000 units per Gm.

Dose.—(Hypodermic) of any of these three 10,000 units. Protective 1,500 units.

Experience gained in the first year of war confirmed the opinion that 500 to 1,000 U.S.A. units is sufficient prophylactic dose for the majority of cases. In severe wounds repeat once or twice at intervals of a week.—A. T. MacConkey, B.M.J. ii./15,849, *see* also Jl. of Hygiene, Jan: 16th, 1914, B.M.J. Oct., 10th '14 ; Jl. R.A.M.C., March, 1916.

For treatment at least 3 000 units intrathecally (intraspinally). At the same time 10,000 units to 20,000 units intravenously and subcutaneously. To be repeated as frequently as the course of the disease seems to demand.—Sir D. Bruce, B.M.J. ii./15,593. *See* also below.

W.O. Committee Memorandum. Primary dose of antitoxin in prophylactic and preventive treatment of wounded at dressing station or field ambulance should be 500 U.S.A. units. Second and following doses of 500 units to be given at home hospitals. *The best results are obtained by intrathecal (intraspinal) injection* at the earliest stage repeated for three or five days and supplemented by intramuscular doses. When operating at the site of wounds give as prophylactic 500 units or more intramuscularly two days before the operation. Intravenous injections should not be made owing to risks of anaphylaxis.—Detailed method of giving intrathecal injection.—B.M.J. ii./16,647,660.

102,000 units of Antitoxin in all injected in a case. The intravenous and intrathecal doses under chloroform. Recovery. R. Lester Scott, L. ii./15,974.

Effectual daily dose is about 10,000 to 12,000 units—the bulk of it to be given intravenously. There is grave danger in interfering with the infected surface of a wound when tetanus has declared itself. This does not apply to amputation above the site of injury.—R. G. Abercrombie, B.M.J. i./16,339.

The duration of the complete passive immunity conferred by a dose of Antitoxin is short—enormous doses would have to be given to obtain immunity for a *length* of time. 250 U.S.A. units would protect a man—weight for weight as compared with a guinea-pig—for a week. 500 units would allow for the man being twice as susceptible.—A. T. MacConkey and A. Homer, L. i./17,259.

Anaphylactic Shock.—The danger of this is negligible when the prophylactic dose is contained in such a small quantity as 3 Cc. of horse serum.

In curative treatment where massive doses have to be given the case is different. S. Wyard advises a small rectal injection of Antigen within 12 hours—or small subcutaneous doses rapidly increased. Removes risks.—L. i./17,105,114.

Usual dose 2,000 units with 30 grains chloretone per rectum. Tetanus Antitoxin prophylactically is a success but the extent of its utility in treatment will doubtless be elucidated by teachings of the present war.—W. Turner, L. i./17,532.

Prophylactic injection prolongs the incubation period enormously on infection. Tetanus may therefore occur after wounds have healed. Five mild cases treated intramuscularly and subcutaneously, all recovered. Six cases intrathecally. Fourteen intravenously—some of these by a single dose of 30,000 U.S.A. units. 13 recovered.—H. R. Dean, L. i./17,673.

Intrathecal injections manifestly superior to intramuscular. Animal experiments.—Sir D. Bruce, L. i./17,680,986, see also F. W. Andrews and T. J. Horder, *ibid.* 682, F. Golla, *ibid.* 686; M. Greenwood, *ibid.* 687; J. Gow, *ibid.* 689.

Modern view of Tetanus. The toxin is transported to the central nervous system along the motor nerves. Therapeutic use of Antitoxin is fully justified and indeed imperative. It is impossible to say in a case whether the toxic dose already in the nervous system is or is not a fatal one. The prompt use of Antitoxin may neutralise just the last amount of toxin in the blood which if it had got into the nervous system would turn the balance against the patient.—F. Ransom, L. ii./17,928.

C. S. Sherrington "Antitetanus Serum in the Monkey," *ibid.* 964. F. Golla.—Recent Statistics *ibid.* 966. R. N. Salaman—Ten Cases *ibid.* 971.

Analysis of cases of Tetanus in the Army between Nov. 1st, 1916 and Dec. 31st, 1917.—S. L. Cummins and H. Graeme Gibson, L. i./19,325.—*See also* Sir D. Bruce, *ibid.* 331.

Preparation.

The method of preparing Tetanus antitoxin consists in rendering animals immune to the tetanic poison by repeated inoculations and increasing quantities, of the tetanus toxin. The animals are then bled and the serum prepared and preserved.

Units of Immunity.—The U.S.A. unit established by a Decree of Congress is commonly employed. It consists of ten times that amount of Antitoxin which when mixed with the Standard Test dose of toxin and injected beneath the skin of a guinea pig weighing 340 to 370 Gm. saves the life of the animal for more than 96 hours. For further information see McConkey.—B.M.J. ii./14,609, and ii./15,849.

For **Veterinary use** the Lister Institute supply special instructions.

The horse injected with Tetanus Antitoxin is not rendered *permanently* immune. *Protection* is a matter of weeks or months at the outside.

Earlier References (*see also previous Editions*):—

Heat appears to be the most energetic of the conditions which favour the development of tetanus. Results from animals.—B.M.J. i./06,108.

Tetanus cured by a number of Phenol Injections. Doses of 2 Cc. of 4% Solution, also 1 Cc. of 5% Solution. Serum being unavailable.—B.M.J.ii./09,1669.

Acute Tetanus cured—two cases—by Antitetanic Injection. Discharge from lacerated wounds should always be examined and if tetanus bacilli found Serum should be given.—B.M.J. ii./10,1970. *See also* B.M.J.ii./14,609

In eye work—recoveries in cases of tetanus developing from the eye.—Oph., Jan., 1911, 70.

Dry pulverised Anti-tetanus Serum as a Wound Dressing.—This is dusted on wounds which may have become infected with dust, mud, &c. Infection may thus be prevented; in addition apply antiseptic dressing. Tetanus may also result in new-born children owing to infection at the umbilicus after birth—sometimes from the use of Fullers Earth.—W. W. W. See also p. 137.

Intra-Cerebral Injection of Anti-Tetanic Serum is also practised.

The injection must be concentrated and free from antiseptic. A blunt needle is used.

Inoculation with antitetanic serum and after 24 or 36 hours injection into the spinal canal of the patient's own blood serum suggested, the amount injected depending on the quantity of cerebrospinal fluid withdrawn.—A. E. Vipond, B.M.J. i./15,288.

Subdural injections of large doses encouraging. 1,500 units given through a drill in the cranium in addition to intraspinal and intramuscular injections. One patient received 36,000 units intravenously and intramuscularly in a week.—B.M.J. i./16,620.

It has been determined that tetanus spores free from toxin and extraneous micro-organisms may lie dormant in the tissues for long periods, and when an **Injection of Quinine** is given, necrosis of the tissues surrounding the site of injection occurs, and should any of these dormant spores gain access to this locality they may light into activity and produce tetanus.— T. R. Hewlett, P.J. i./13,94. See also Quinine Acid Hydrochloride, p. 670.

Trypanosomiasis. *Vide Vol. II.*

Tuberculosis.

For the continuous antiseptic inhalation treatment of pulmonary tuberculosis see p. 372, 373.

The results of the first year's working of the compulsory notification of infective diseases, including tuberculosis (*vide infra*) shows that tuberculosis heads the list with 110,551 cases—which amount to 3·06 per 1000. Scarlet fever comes next with 2·98 per 1000.—Na., Apl., 24,1913.

Tuberculous Milk as source of Infection. Vide Vol. II. under B. tuberculosis.

See also Nutrimenta, Boiled *v.* Unboiled Milk, p. 572.

Denunciation of **' fake cures ' for tuberculosis.** No remedy taken, eaten, inhaled or injected will cure. The only real cure is a combination of fresh air, good food and rest under direction of a competent physician. Opinion in U.S.A., promulgated by President Taft.—B.M.J. ii./12,1490.

Tuberculosis Notification Order.—The order is designed to complete the organisation for ensuring notification to health authorities of all cases of the disease. A medical practitioner is not required to notify any case which has already to his knowledge been notified either under this Order, under the Poor Law Order (1908), or under the Hospitals Order, if the notification has been made to the M.O.H. of the Area within which the patient resides ; but if a patient who has been notified in the area of one Sanitary Authority removes into another a fresh notification to the M.O.H. of the new area should be given. Patients in a prison, reformatory, school or lunatic asylum and patients in a Poor Law Institution, or under the care of a Poor Law District M.O., are not to be notified under this Order, nor are applicants for life insurance, nor a passenger or member of the crew of an emigrant ship, nor an inmate of any building, ship, vessel, boat, cart, van, shed, or similar structure belonging to His Majesty the King.—B.M.J. i./12,44.

Duplication or even triplication of notification occurs. The local practitioner and the consultant both notify, etc. The multiple notification is authorised in the Order and steps are taken to prevent it affecting statistics on prevalence.—L. ii./13,1639.

Australian quarantine.—Any passenger deemed to be suffering from tuberculosis, even in an early stage, is usually prohibited from landing—or a heavy bond is exacted binding him to leave if not recovered at the end of six months.—B.M.J. ii./12,1328.

PROGRESS OF INFECTION IN PHTHISIS. — Tuberculosis causes immunity—the resistance is a very specific matter,—the apparently strong may succumb to it. It is commonly assumed that resistance goes hand n hand with general bodily health. There is a menacing danger of the infection of new areas and everything should be done to avoid this ; absolute rest in bed in the early stages will do it and should be acted upon without fear that the general health will suffer.

Experiments made for the Tuberculosis Commission showed that some degree of immunity to bovine tuberculosis can be induced in calves by injecting them with cultures of Tubercle Bacilli of the human type. Similarly in man the disease tends to confer some immunity, and it is on the acquisition of the new or improved powers of resistance which are the cause of the immunity slight though they be, that the hope of recovery mainly depends. Experiments showed further that in man, as in the ox, the severity of a tuberculous infection is largely determined by the number of Bacilli gaining entrance at the start. In its tendency to produce immunity tuberculosis differs from other diseases only in degree. During the course of infection the powers of resistance are constantly increasing.—L. ii./10,1539.

FLIES AS CARRIERS OF INFECTION. The tubercle bacillus from sputum was found to live three days in the fly's intestine, but if a pure culture was used, it could be recovered nearly a fortnight afterwards in the intestine. It has been suggested that *Empusa muscae*, the parasitic fungus which kills off flies in large numbers in the autumn, might be employed to destroy the flies,—but it would be a difficult scheme to work,—similar ideas with locusts failed.—B.M.J. ii./10,1271.

Prevalence of tuberculous mastitis. Bovine animals suffering from ulcerative tuberculous lesions, especially of respiratory organs, alimentary canal, genito-urinary organs and udder, constitute the chief factor in determining excessive prevalence of bovine tuberculosis in certain districts.—Prof. Delepine, Manchester.—P.R.S.M., Epid. Sectn., Mar., '10,218.

The importance of an organisation to visit the homes of consumptives to examine and treat "contacts."—Squire, P.R.S.M., Epid. Sectn., Dec., '10,27

The great mass of cases of consumption are thought to be not contagious though some acute ones are also those with large cavities teeming with tubercle bacilli.—Theodore Williams, P.R.S.M., Epid. Sectn., Dec., '10,43.

Many chronic diseases such as nervous debility, rheumatism, etc., are thought to be due to toxæmia set up by the unhealthy condition of the large intestine. Such conditions are favourable to the development of cancer and tuberculosis. Metchnikoff advocated the **removal of the large intestine** to invoke healthy longevity. At Guy's Hospital a child, apparently in the last stages of incurable tubercular joint disease, had, as a last resource, all but 9 inches of the lower intestine removed. In a few weeks the internal organs resumed their normal functions and the patient was in apparently good health again. Other cases were operated on with similar success.

Tuberculosis statistics. Difficulties of preparing records. Diagnosis, apparently healthy 'carriers,' etc.—L. ii./13,1693.

The 'Soil' and the Seed in Tuberculosis. It is not heredity which determines whether the children of consumptives will develop the disease. The seed creates the soil.—B.M.J. ii./12,1434.

For the relationship between human and other forms of Tuberculosis and tests to distinguish types of B. tuberculosis see Vol. II.

Hospitals for Treatment of Tuberculosis. Is it true that we first contract tuberculosis by infection from one another at any stage of life ? The view no longer holds water and the plan of dealing with tuberculosis (by isolation, etc.) based upon it has failed. Many say that it is very likely we infect one another through the respiratory tract, but laboratory experiments do not support it.

Animal experiments prove that infection is by food. The Insurance Act method of dealing with tuberculosis has failed. The lines of prevention laid down are impossible. If the respiratory route is the one by which human tuberculosis is engendered we have no right to ask a number of perfectly healthy men and women to act as physicians, nurses, etc., etc., in institutions for the care of tuberculous pulmonary disease—and in like predicament are the children who play in the streets and inhale the tubercle-laden dust. (Some would make us believe the dust is sterilised by the sunlight—but sunlight is often absent in the British Isles).

If the care of pulmonary tuberculous patients is to be based on the belief that phthisical sufferers especially have caught the infection at a comparatively short time before they develop the signs it is impossible to be logical. No community could stand the application of adequate and ample rules.

Adequate sanatorium treatment for the poor—other than those of the so-called early cases of pulmonary tuberculosis—does not exist. The ultimate fate of these cases is sad in the extreme—they return from a stay in the fresh air to a bed-ridden end under the care of health visitors and tuberculosis officers.

The other way of tackling the tuberculosis problem, however, is the view that *every* member of society *nolens volens* is infected with the tubercle bacillus in early life and only those develop the disease whose soil of their bodies is non-resistant. The great purpose of the Insurance Act based as it is on assumptions rather than on fact, of trying to stamp out tuberculosis by prevention, is rendered null and void by making the advanced tuberculous subject live in his own home. The *advanced* consumptive needs more help than he gets.

The paper concludes with an eloquent appeal for these bed-ridden cases and "to the lasting shame of those of us who are responsible for the management of this disease, these helpless men, women and children will be sent home for domiciliary treatment, a burden to themselves and their relatives." 'Observation' Hospitals are needed for doubtful cases as also Invalid Homes where those suffering from pulmonary tuberculosis, and who are rendered incapable thereby, may be nursed and treated until they are fit to earn their living or until they die. These Invalid Homes need not be in the country. They may in fact be in the heart of populous centres and therefore near their families without being a burden to them.—H. Batty Shaw, B.M.J. ii./19,97.

Tuberculins.

The time has arrived to discard a large number of the Tuberculins which in our last Edition had developed to such an amazing number and complexity that even a deep study of the subject could hardly do justice to a subject so involved.

There is no doubt that the use of Tuberculins in general has fallen off to an extraordinary degree. We are absolutely in accord with a writer in the B.M.J. (J. A. Lindsay, B.M.J. ii./18,20) that it is significant that there has been no consensus of opinion either as regards the proper variety of Tuberculin to use or the correct dose to employ.

It has been stated that no less than 200 different Tuberculins have been introduced since Koch made his first preparation.

W. Camac Wilkinson, B.M.J. ii./18,45, in reply to Lindsay says most tuberculins are valuable but not all are properly standardised. He brings evidence by results at home and abroad. J. R. Gillespie *ibid.* is in favour of the use of tuberculin in all a-febrile cases. *See* also E. L. Prest, *ibid.*

Value of Tuberculin as an addition to Sanatorium Treatment. The opinions expressed are very reserved. It is not a cure in the ordinary sense and the good effects are at the best exerted almost imperceptibly and over a long period. It is slow in action. Marked reactions are a source of danger. Reactions to 100° F. do no obvious harm but there is no evidence that they are of benefit.—N. D. Bardswell, L. i./15,68.

R. W. Allen in the British Journal of Tuberculosis, Oct., 1919, puts forward the view that the toxicity of all the therapeutically active forms (some are almost devoid of it) is such as to prevent the use of doses of the bacterial protoplasm sufficient to act as antigen. **Tuberculin 'M'** is devoid of toxicity but capable of provoking definite focal reaction and exciting the formation of adequate antibodies when given in sufficient dose. It is described on p. 886 *et.seq.*

The preparations to which predominance is now given are therefore **Old Tuberculin, Albuminose-Free Tuberculin or T.A.F., Tuberculin M, Bacillary Emulsion or B.E.** and **Beranek's Tuberculin.**

It is hoped that this simplification will be appreciated —the products now remaining—each polyvalent and available in the Human and Bovine types should be sufficient for general treatment.

Haemoptysis. Cases with—never known harm to follow use of Tuberculin. (No details as to kinds used).—E. H. Coleman, B.M.J. ii./16,37.

Value of Tuberculin. 'Medicus' writes that under tuberculin he became steadily worse—larynx badly affected. On giving it up and with climatic treatment he recovered.—B.M.J. i./16,840. Effect thought to be due to the Tuberculin.—J. Mackeith, B.M.J. i./16,904; ii./16,64.

Struck by the fact that tuberculous subjects in necropsies show a complete absence of malignant growths I. Holmgren found that Tuberculin injections may in some cases be given with advantage to cancerous cases.—B.M.J. ii./16,297.

Absolute rest in cases (comparatively advanced) of pulmonary tuberculosis not insisted upon. A man with temperature 100° F. in six months brought down to normal and at end of 12 months dose of 1 Cc. of Old Tuberculin reached.—A. Moss, B.M.J. i./18,497.

Though used largely during the last ten years Tuberculin not regarded as satisfactory.—E. E. Prest, B.M.J. i./18,58.

Experiences with B. E. Bovine, B.E. and P.T.O. in general practice.—J. L. Bogle, L. ii./16,61.

Tuberculin, Old, Tuberculinum Koch. P.G.V. That of **P. Belg.** is similar.

This is an amber coloured liquid—a mature glycerin broth culture (4 to 5 weeks old) of the tubercle bacillus (*typus humanus*) boiled and concentrated to $\frac{1}{10}$ its volume, from which the dead bacilli are then removed by filtering. The preparation contains the endotoxins yielded by the autolysis of the bacilli and the true excretory products of the bacilli all of which are contained in T.A.F. As it embodies furthermore the toxic products resulting from the breaking up of the proteins in the culture medium which are entirely lacking in specific action and therefore valueless and indeed markedly contributory to the general reaction it might well be entirely replaced by the A.F. preparation.. It contains no preservative except the Glycerin, about 40%. It is supplied in 1 Cc. bottles. Dilutions are made with 0·5 Phenol Solution.

In the **Standardisation** of this Tuberculin, guinea pigs are injected with a range of doses from 0·05 to 0·3 Cc. of the preparation, and simultaneously a further series of the animals is injected with a standard preparation,—of this 0·1 to 0·25 Cc. usually suffices to kill an animal in 24 hours. If the liquid under examination produces characteristic Tuberculin poisoning in this time the preparation is taken as suitable for use.

It has been used (*a*) as a ***Diagnostic*** both in man and beast, and (*b*) for treatment.

(*a*) ***To diagnose tuberculosis in man.***—The patient's temperature must not be abnormal at the time of injection. *Dose.*—0·001 Cc. diluted to 1 Cc. (termed a 'No. 3 Dilution'), or if patient is weakly, or a child, use $\frac{1}{10000}$ Cc. (0·0001 Cc.) in 1 Cc. of diluent (called a 'No. 4 Dilution').

If there is no rise in temperature after the first injection, inject a double dose on the next day but one. If the first injection causes even ½° F. rise, wait until the normal temperature is reinstated, and inject the same dose again. If the reaction is now more violent than after the first injection tuberculosis is present. If no reaction appears after the first small doses, the dose may be increased to 5 Cc. of No. 3 Dilution (above mentioned) and finally to 1 Cc. of Dilution No. 2, *i.e.*, $\frac{1}{100}$ Cc. of the strong liquor. If there is no reaction on twice repeating the latter dose there is no recent or progressive tuberculosis.

Inject the dose in the *subscapular region* in the morning. Patient should rest and temperature be taken every three hours.

Alternatively commence with 0·0002 Cc. as initial dose, then give 0·001 Cc. as second, 0·005 Cc. as third, and lastly 0·01 Cc. as fourth or final dose.

Should the temperature increase by only ½° F., the previous dose is repeated, after the temperature has resumed the normal.

Koch fixed the dose limit of his old tuberculin, following which a reaction may still be regarded as specific, at 0·01 Cc. Others use far larger doses up to 0·05 Cc.; others again advise no increase of the dose should take place, but 0·0002 Cc. should be first injected, and in the case of no reaction setting in, this dose should be repeated four times.

Effects of Injection.

The tuberculin seems to act upon the tuberculous lesions, and even partly destroys them—it is not definitely destructive to the tubercle bacilli—or their surroundings, and subsequently there is a risk of further symptoms from blood poisoning dependent on this. In many instances the tuberculin has appeared to cause a very serious fall in blood pressure, leading even to a fatal issue; in others the mischief has seemed to be due to a coagulating influence on the blood corpuscles, tending to blood stasis, congestion and hæmorrhage, especially in unhealthy areas adjacent to tubercular deposits; and again, tuberculin does at times show an irritant effect on the leucocytes, causing inflammatory swellings.

It is stated that by repeating the injection of 0·0002 Cc. and not increasing (*vide antea*) unpleasant effects are not seen.

Contra-indications for the injection are laryngo-tuberculosis, cardiac troubles, diabetes, nephritis and pregnancy. In epilepsy and neurasthenia should be given with the greatest caution.

The general reaction usually sets in about 8 to 16 hours after the injection—more or less severe attack of shivering, with headache and pains in the limbs.

At the point of injection, redness appears after 1 to 2 hours, and gradually an infiltration shows itself varying in size from that of a farthing to that of half-a-crown, the absorption of which may take several days.

The height of the reaction is indicated by a profuse outbreak of sweating, a lessening of all the other symptoms and a more or less speedy return of the temperature to normal. Generally the entire reaction is over in 24 to 36 hours. There may be slight lassitude, and in the case of phthisis an increased expectoration, disappearing in a few days.

In lupus patients, besides the general reaction, a local reaction sets in—considerable reddening and swelling of the diseased parts.

For diagnosis (? tuberculous kidney) there is little danger of an undue reaction if care be taken in selecting dose and patient. Temporary localised tenderness in the loin, and alteration in character of the urine (presence of pus cells and Tubercle Bacilli) often indicate both the site and nature of the suspected trouble.—B.M.J. ii./o8,997.

The Diagnostic use of this preparation is not favoured now.

Reliable observers have shown that between 40 and 60% of **healthy individuals react to Tuberculin hypodermically as diagnostic.** This must be remembered in an estimate of the value of the injection.—L. ii./13,150.

E. E. A. T. Rigg holds, as result of an investigation at suggestion of H. Batty Shaw (see **For and Against Tuberculin**, p. 890), that nothing can be hoped for from the provocative use of Old Tuberculin in the diagnosis of so-called "closed pulmonary tuberculosis."—L. i./13,99.

Tuberculosis of the eye. In diagnosis with Old Tuberculin the focal reaction may have disastrous consequences.—S. Stephenson, L. ii./13,1533.

Production of local reaction at the seat of inoculation and the raising of temperature as the result of Tuberculin given as diagnostic affords no useful information.—N. D. Bardswell, L. i./15,71. *Old Tuberculin is not specifically mentioned.*

Routine diagnostic doses of Tuberculin may not be followed by a *temperature* appreciably over the patient's normal temperature either in early or late stages.—D. Forbes and C. W. Hutt, L. ii./16,753.

The Diagnostic Injection method is regarded almost unanimously as dangerous and misleading.—C. Lillingston, L. ii./16,879.

As a diagnostic of tuberculosis in cattle the injection of old tuberculin into healthy animals produces no reaction, while in tubercular beasts it is claimed there is a rise after injection.

It is important to note that after a dose of Tuberculin in cattle, a *further dose during six months may fail to again produce a rise in temperature.*

A supplement to the Appendix to the Final **Report of the Royal Commission** on Human and Animal Tuberculosis states that in cattle known to be infected with bovine bacilli the Tuberculin test failed in 31% of cases suffering from severe and progressive tuberculosis, while of 1,217 normal animals only 0·4% reacted.—L. i./13,1540; P.J. i./13,720.

(b) Treatment with old Tuberculin.

This is now little used for the purpose. Tuberculin A.F. *q.v* replaces it.

Unguentum Tuberculin (Old).—

Lupus vulgaris, diagnosis and treatment by use of Old Tuerculin Ointment.—5% of Old Tuberculin in a basis of soft Paraffin. This is well rubbed in for one to two minutes and is also applied by means of a bandage to the affected area,—the part being previously cleansed and crusts, if any, removed. On removal of the application, varying degrees of hyperæmia and swelling are seen in the actual lupus tissue, with a moderate amount of hyperæmia with reddish papules extending one or two inches into the surrounding healthy skin (**Moro reaction** *q.v.*). After cleaning the surface, similar applications for treatment are made for the next three or four days, till the lesion closely resembles that produced by the application of a Salicylic Acid Plaster. This typical reaction only obtains in the actual disease and does not extend into the surrounding healthy skin. The pain produced may be considerable. Results good,—no rise in temperature or pulse and no headache.—B.M.J. ii./10,2023.

Tuberculin A.F. (**Albumose-Free**). *Dose* (Initial).—0·00001 Cc. in pyrexial cases; 0·0001 Cc. in apyrexial cases. Subsequent doses are determined from a study of the resulting reactions—constitutional, or general and focal. As a general rule reactions of any magnitude should be allowed to subside before a fresh injection is given.

A light amber coloured liquid the product of a 4 to 6 makes old culture of the tubercle Bacillus in an albumose-free medium, containing inorganic salts and Citrates, the sole nitrogenous food being Asparagin.

This preparation as already indicated may well replace Old Tuberculin.

It is used as *diagnostic* subcutaneously by conjunctival, intracutaneous and percutaneous application.

For treatment it is employed subcutaneously where a fold of skin and under-lying tissues can be raised. Reactions obtained are thought to be specific, and anaphylactic symptoms are excluded in consequence of the absence of non-specific proteins.

Tuberculin 'M.' Human, Bovine and Mixed Types (Wimpole Institute).

Dose, initial (subcutaneous)—0.00001 to 0·0001 Cc. according as the case is pyrexial or not, rising gradually to 0·2 or even 1 Cc. Dilutions are made in 1 Cc. of diluent using 20% Glycerin for the purpose.

N.B.—Doses should always be stated in decimals as above and by no other method.

Although a stereotyped increase of dose is not advised the following scheme will be useful as a guide (reading downwards in each column) :—

0·00001 Cc.	0·0001 Cc.	0·001 Cc.	0·01 Cc.
0·00002 ,,	0·0002 ,,	0·002 ,,	0·02 ,,
0·00003 ,,	0·0003 ,,	0·003 ,,	0·03 ,,
0·00004 ,,	0·0004 ,,	0·004 ,,	0·04 ,,
0·00005 ,,	0·0005 ,,	0·005 ,	0·05 ,,
0·00006 ,,	0·0006 ,,	0·006 ,,	0·06 ,,
0·00008 ,,	0·0008 ,,	0·008 ,,	0·08 ,,
			0·1 ,,
			0·2 ,,

As a rule weekly injections are given.

This preparation may replace Tuberculin T.R. of Koch which has not hitherto been available.

R. W. Allen, Br. Jl. Tuberculosis (Oct. 1919) deals with the method of preparation of this Tuberculin. Several strains of living human T.B. are used—they are treated with various solvents for the fats and waxes, dried and weighed and treated with Hydrogen Peroxide until only a slightly apparently insoluble residue is left. After neutralisation this solution is diluted with Normal Saline containing 0·3% Tricresol until 1 Cc. contains 20 mgr. of the original dry bacilli. Finally it is mixed with an equal volume of Tuberculin A.F. The author of the paper tried the preparation on himself in full doses and has given several hundred doses from 0·0001 to 1·0 Cc.

It has high antigenic value and immunising power as is shown by the production of mild focal reactions following the use of moderate appropriate doses. At the same time no general or constitutional reaction is produced other than may be attributed to the focal reaction. Doses and intervals are to be controlled by these reactions, no increase being made so long as a dose excites the desired focal reaction and this latter must be allowed to subside before re-inoculating. As a rule up to 0·2 Cc. or even 1·0 Cc. of the undiluted Tuberculin may be given; the higher the dose tolerated the greater the immunity produced. Clinically in almost every case in which Tuberculin 'M' has been properly tried disappearance of bacilli from the sputum has been caused. This Tuberculin is well suited for use by hospitals, sanatoria and tuberculosis dispensaries and for the treatment of discharged tuberculous soldiers and others who cannot afford sanatorium treatment and who cannot be treated under ideal conditions.

A certain amount of risk regarding dose increase may be permitted at times as the preparation is relatively atoxic, but increases have to be made according to the case rather than on a set scheme. It is safely used in all forms of tuberculosis, surgical as well as medical. In pyrexial cases autoinoculation should be minimised by absolute rest followed later by graduated exercise. It is suggested that a course of treatment with this preparation may be followed with advantage by one with 'A.F.' or 'B.E.' the initial dose of the latter being then 1/20th to 1/10th of the final dose of 'M.'

Regarding '**T.R.**' of **Koch** a few words may be given—full details are provided in our last edition p. 907 *et seq.*

It contained ***2 mgr.*** of solid substance ***not*** 10 mgr. as originally stated. An *enormous* amount of confusion was caused by this and indeed by the use of the mgr. basis of dose at all. It may be recalled therefore that :—

0·00001 ($\frac{1}{100000}$) Cc. of 'T.R.' = 0·00002 ($\frac{1}{50000}$) mgr. (or 0·00000002 Gm.) of solid substance.

'Bold' Dose.—The large doses advised by Koch, starting from 0·0002 Cc. and repeated every second day with moderate increase of dose so that a rise of temperature greater than 0·9° F. was avoided—are not now generally administered.

The ***English School*** start with smaller initial dose (as already outlined) and do not look for any marked rises in temperature. Tuberculin 'M' is suited for use by this bold dose method if the user is a follower of the German School.

Tuberculin preparations per os. Tuberculin T.R. was given by some workers *per os* with immunising response.

The German '**P.T.R.**' indicated Bovine T.R. (P stands for Perlsucht=Pearl disease *i.e.* tuberculosis of serous membrane of cattle producing pearly nodules or tumours, often pendulous).

A very extensive discussion has taken place on what may be called **Cross-Vaccination**—*i.e.*, as to whether Human or Bovine Type of Tuberculin is to be used in a specific case. The problems as to the relation between human and bovine types are *sub judice.*

General References to Tuberculins and Treatment.

A large number of the older references to early work have now been removed—vide Edn. XVI., p. 912.

In lupus remove crust and encourage lymph flow by local use of dilute Salt and Sodium Citrate Solution. Streptococci and Staphylococci may be present these must also be attacked by appropriate Vaccine.—Sir A. E. Wright, L. ii./08,731.

There is still much to learn as to the actual relationship between the Opsonic Index and the production of immunisation. Everything points to the early and final disappearance of the disease.—*Ibid.*

To secure the best results in eye infections, dose considerably in excess of those, which would be used in similar localised infections elsewhere, must be employed and increased, if necessary, with boldness. The area of infection is small, the blood and lymph flow limited, the resultant amount of toxæmia correspondingly small; large doses of vaccine may, therefore, be safely employed, without fear of increasing the toxæmia.—R. W. Allen. Pr. May '08 737.

St. Mary's Hospital results of inoculation treatment of tuberculosis. Tuberculous lymphatic glands 79 cases—27 cured, 22 much better, 18 better, 8 are unchanged, and 4 are worse. Best results to be anticipated in young children and young adults between 15–25. Ulcer, sinus and abscess 50 cases treated. 10 cures, 20 much better, 9 better, 8 unchanged and rest doubtfuls. Treatment averaged 2 years in the successful cases.—B.M.J. ii./09,532.

There is grave danger in giving Tuberculin in phthisis whilst patients are walking about and pursuing their avocations. Tuberculin causes hyperæmia and the more hyperæmic the lesions the more easily will a dangerous auto-inoculation be induced by exercise. It is true that cure may be through autoinoculations, but if autoinoculations be allowed to become excessive through Tuberculin and exercise combined, then the disease will inevitably continue. With regard to *length of time that it is necessary to continue treat-*

ment:—(1) Patient should be able to take $\frac{1}{5000}$ mgr. 'T.R.' without any effect noticeable either in temperature or index. (2) After sufficient exercise to cause exhaustion there should be no sign of an autoinoculation, *i.e.*, the *Opsonic Index should not fluctuate.*—B.M.J. i./11,132.

Old-standing, semi-quiescent tuberculous cases have yielded in a surprising fashion.—L. ii./11,1626

A course of Tuberculin may be recommended provided the patient has sufficient vitality to yield the requisite response demanded by a proper use of the remedy.—Sir R. Douglas Powell and P. Horton-Smith Hartley, L. ii./11. 1488.

A welcome 'moderate' analysis of about 300 phthisical patients treated with Tuberculin.—L. ii./11,1648.

Vaccines in eye work.—Tuberculins T.R., B.E., etc., results with.—B.M.J i./12,589.

Uses of various Tuberculin Preparations in pulmonary tuberculosis.—A. Latham, L. i./12,1109 ; B.M.J. i./12,294.

"Controlled" Tuberculin Treatment *v.* Sanatorium (ordinary hospital) treatment. No greater improvement in physical signs in the former than in the latter.—E. E. A. T. Rigg, B.M.J. i./13,213.

Glandular Tuberculosis 54 cases. Vaccine Treatment—B.E. with initial dose small—often 1/200,000 mgr., increased to 1/200 mgr. if patient could stand it. When mixed infection present the complication treated with appropriate Vaccine.—Ian Strathers Stewart, Jl. Vac. Therapy, July, 1912.

Pulmonary tuberculosis treated with Tuberculins at King Edward VII's. Sanatorium—good results. 'A.F.' and 'B.E.' used mostly, 'T.A.' and 'T.R.' in a few cases. *Initial dose.*—0·0001 Cc. or 0·00001 Cc. according to the case. Dose increased when the last dose given produced no marked general or focal reaction. In increasing the doses the scheme followed is to give 0·1, 0·15, 0·2, 0·3, 0·5, 0·7 Cc. of each of the various dilutions of Tuberculin used. Interval between dose 2 days with higher dilutions, with the lower and the pure preparation 7 days or more.—N. D. Bardswell, L. i./13,750.

With the use of Tuberculin at the King Edward VII. Sanatorium the number of patients who lost their Tubercle Bacilli increased by 17% over what was obtained merely by Sanatorium treatment.—L. i./13,965.

Prophylactic inoculation of members of families whose parents are tuberculous. Tubercle bacilli dissolved in Benzoyl Chloride 2% with liquid paraffin as diluent with addition of 0·032 Gm. (½ grain) Iodoform dissolved in ether. Dosage 0·000001 increased to 0·001 mgr. of Tubercle Bacilli as removed from Dorset Egg Medium for infants and ten times this for older children and up to 0·1 mgr. for adults. Usual interval 1 week. Clinical results satisfactory. Harmless and inexpensive.—W. M. Crofton, Med. Press, January i./13, B.M.J. i./15,629.

Tuberculin Treatment.—Though much experience with it, still uncertain as to its value. A general survey.—Hector Mackenzie, L. ii./13,521.

Scleritis is probably almost always caused by *B. Tuberculosis.* Tuberculin Treatment (T.R. 1/5,000 mgr.) has been used but may be an extremely dangerous and double edged weapon owing to focal reaction.—T. Harrison Butler, B.M.J. ii./13,979.

In tuberculosis of the iris a patient with a hectic temperature received a small dose of 'T.R.' after the temperature had been brought to normal by rest in bed. The result was disastrous and hastened the inevitable loss of both eyes. Focal reaction in eye cases always does harm.—T. H. Butler, B.M.J. ii./13,980. *See* also S. Stephenson, L. ii./13,1530.

Fever in pulmonary tuberculosis. B.E. in preference for treatment. The dose must be extremely small, 1/100,000 mgr. initially. Its use in some cases produces an immunising effect sufficiently strong to turn an unfavourable course into a more favourable one.—F. J. Wethered, L. ii./13,1046.

National Conference for Prevention of Consumption (Aug. 1913).

Opinions of Sir J. K. Fowler, Sahli, Sims Woodhead, W. C. White, of Pittsburg, and others. Sims Woodhead says that the exotoxic products of the bacillus are probably negligible factors in the production of symptoms, antitoxic sera are useless. He lays great stress on the avoidance of focal reaction. Béranek points out that with exception of 'B.E.' all Tuberculins are simply solutions of tuberculous toxins. To him the treatment of a disease by the injection of its own toxins, which, when produced by the bacilli in the body weaken the natural defences seems paradoxical. He holds, however, that the toxins produced by the body differ from those made artificially by Tuberculin, and that the differences justify their use therapeutically. He assumes that the toxins of Tuberculin are more readily dealt with by the protective cells than the toxins produced by Bacilli *in vivo* and that the diastatic function of these cells is thus exercised and ultimately educated to be better able to neutralise the true tubercle toxin. His Tuberculin is, therefore, prepared from an attenuated bacillus.—Pres., 1913,328.

For and Against Tuberculin.

H. Batty Shaw says, if it were proven that tuberculous cattle could be cured by vaccination with Tuberculin its use would be widespread in veterinary practice, and its employment would be general in man, but the reports as to cattle do not exist.

Batty Shaw admits that the success with Antityphoid inoculation when brought to bear on Tuberculin treatment is a difficult argument to combat. The advocates of Tuberculin treatment of *established* tuberculosis, or for Vaccine treatment of any *established* infection, feel that if typhoid fever can be reduced in case incidence and in case mortality by vaccination before the disease is developed, it should be able to be controlled by vaccination after the disease is developed. Figures have yet to be published to prove this speculation. Antityphoid amboceptors developed in a healthy individual before he contracts typhoid are ready to digest the bacilli as they arrive. If Tubercle Bacilli, on the other hand, gain access to the body they surround themselves with an almost impenetrable ring of fibrous tissue, caseous or calcified material, then any subsequent development at a remote part, *e.g.*, of the skin or subdermic tissues, of 'sessile' tuberculin or tuberculo-amboceptors by means of injections of Tuberculin or Tubercle Bacilli, may be quite unable to reach the Tubercle Bacilli.—B.M.J. i./13,921. J. W. Allan supports this and enquires as to decided and cumulative effect on the pulmonary lesions—*ibid.* p. 1140. (*See* also E. E. A. T. Rigg, on alleged diagnostic value of Old Tuberculin.—L. i./13,97)

Sir F. C. Eve's reply to the above was that observation by the clinician is more reliable than theories. He suggested that the experiments must be continued on a larger scale, which he believed would reverse the Author's opinions. He said, if clinicians find as a matter of fact (as he did) that Tuberculin does a large amount of good, it becomes the duty of theorists and experimentalists to modify theory and find the reason of the discrepancy in the animal experiments.—B.M.J. ii./13,47.

Tuberculin has not proved a success in Sir Watson Cheyne's hands.—B.M.J. ii./12,633.

E. H. Fenwick writes that he cannot point to a single cure with Tuberculin, but it is a most useful remedy. It acts best in women. Often dangerous in widespread tuberculosis such as genito-urinary tubercle. Its use is restricted.—B.M.J. ii./12,857.

The ideal Tuberculin has not yet been found and the method of its action on healthy and unhealthy cells respectively has not been satisfactorily worked out. *In spite of all research the treatment of any individual case must be more or less of a leap in the dark.*—Editorial, B.M.J. ii./13,1243.

Attenuation of Human, Bovine and Avian Tubercle Bacilli.—N. Raw, L. ./10,376

Graduated Labour Treatment—Address in Medicine on Vaccine Therapy. Consideration of spontaneous auto-inoculation. Spontaneous auto-inoculation is believed to be the cause of the irregular fluctuations in the Opsonic Index of a patient suffering from advancing pulmonary tuberculosis When graduated labour was introduced as an adjunct to Sanatorium treatment it was not realised that in addition to the benefit from the increased functional activity of the organs and tissues of the body, patients were at the same time treating themselves with doses of tuberculin of their own manufacture.—B.M.J. ii./08,248. Curative effects are produced in quite early pulmonary tuberculosis by means of these artificial auto-inoculations by allowing the patient to take *sufficient* exercise. "In theory, the ideal treatment should consist of reduction of auto-inoculation, and then artificial immunisation with tuberculin. But clinically, these cases want more than this : the loss of weight and poor general condition of body and mind, have to be corrected, if the patient is to be returned in the shortest possible time. To effect this, we must look beyond the injections of Tuberculin, and must take the patient to pure invigorating air and healthy surroundings, and put him through a course of physical exercise carefully graduated for his individual needs and condition." Rest is essential in febrile cases of consumption, and in these cases injections of Tuberculin, using as a guide the Opsonic Index, is the treatment indicated.—Pr., May,/08,665. See also B.M.J. ii./09,1055.

'AUTOINOCULATION' is criticised by W. C. Bosanquet as having a 'comforting sound.'—It is largely a hypothetical process. Rise in temperature as result of exercise occurs in normal persons. It may be the tuberculous person's temperature rises more readily than that of the healthy man. Work is no more a specific for consumption than rest or Cod Liver Oil. B.M.J. i./11,126.

Tuberculous eyes treated by dilutions of P.T.O.—H. A. Ellis and H. M. Gay, L. ii./17,156.

Opsonic Index. For a note on this factor see *Vol. II.*

Tuberculin Bacillary Emulsion, 'B.E.' (Human Type, Bovine Type, or the two mixed are available).—*Dose.*—0·00001 to 0·00002 Cc. as a rule to begin with. For further details see p. 892.

As proof of the immunising properties of his "T.R." and other preparations Koch demonstrated the production of specific immunising bodies which he called *Agglutinins.* These bodies have the power of precipitating emulsions of triturated Tubercle Bacilli. Such Agglutinin-containing preparations were thought to be of great value as indicating the commencement of the healing process. As Agglutinins develop their action *in vitro* chiefly on emulsions of Triturated Tubercle Bacilli, an emulsion of this kind was advocated for treatment to stimulate the production of Agglutinins. It was found that many tuberculous patients, especially serious cases, showed no Agglutinins at all. It is satisfactory therefore to view Agglutinins as immunising in the blood bodies indicating the commencement or progress of the immunising process, but which necessarily become absorbed or otherwise disposed of by the bacillary originators of the infection. 'T.R.' was found not invariably capable of increasing the power of agglutination of patients' sera,—this he thought due to the fact that the soluble substances rejected in the manufacture should be retained. The difference between 'B.E.' and 'T.R.' is that B.E. contains the *entire body substance of Tubercle Bacilli* whilst with T.R. the *soluble constituents* of the Bacillus are first rejected. The soluble Endotoxins are thought to play an important part in the production of Agglutinins and are contained in 'B.E.'

'B.E.' is, therefore, a suspension of entire pulverised Tubercle Bacilli in a mixture of equal parts Glycerin and Water. 1 *Cc. contains* 5 *mgr. of thoroughly dried Tubercle Bacilli.*

It is more toxic and possibly more highly immunising than 'M.' (or T.R.) and may be used to complete a course of treatment beginning with the latter. The dose is increased carefully at a rate which causes little or no rise in temperature (1° F.) and with intervals of about 1 week. With the small initial dose stated it is very exceptional for any reaction to appear. Should a slight rise occur the dose in question should not be exceeded and temperature must have reached its previous level.

Table for conversion of Doses of Bacillary Emulsion ('B.E.') Human or Bovine, or mixed Human and Bovine, into equivalents of 'Bacillary Substance.'

0·00001 (1/100,000) Cc. = 0·00005 (1/20,000) Mgr. **Bacillary Substance.**
0·00002 (1/50,000) Cc. = 0·0001 (1/10,000) Mgr. ,,
0·00003 (3/100,000) Cc. = 0·00015 (3/20,000) Mgr. ,,
0·00004 (1/25,000) Cc. = 0·0002 (1/5,000) Mgr. ,,
0·00005 (1/20,000) Cc. = 0·00025 (1/4,000) Mgr. ,,
0·00006 (3/50,000) Cc. = 0·0003 (3/10,000) Mgr. ,,
0·00008 (1/12,500) Cc. = 0·0004 (1/2,500) Mgr. ,,
0·0001 (1/10,000) Cc. = 0·0005 (1/2,000) Mgr. ,,
0·0002 (1/5,000) Cc. = 0·001 (1/1,000) Mgr. ,,
0·0003 (3/10,000) Cc. = 0·0015 (3/2,000) Mgr. ,,
0·0004 (1/2,500) Cc. = 0·002 (1/500) Mgr. ,,
0·0005 (1/2,000) Cc. = 0·0025 (1/400) Mgr. ,,
0·0006 (3/5,000) Cc. = 0·003 (3/1,000) Mgr. ,,
0·0008 (1/1,250) Cc. = 0·004 (1/250) Mgr. ,,
0·001 (1/1,000) Cc. = 0·005 (1/200) Mgr. ,,
0·002 (1/500) Cc. = 0·01 (1/100) Mgr. ,,
0·003 (3/1,000) Cc. = 0·015 (3/200) Mgr. ,,
0·004 (1/250) Cc. = 0·02 (1/50) Mgr. ,,
0·006 (3/500) Cc. = 0·03 (3/100) Mgr. ,,
0·008 (1/125) Cc. = 0·04 (1/25) Mgr. ,,
0·01 (1/100) Cc. = 0·05 (1/20) Mgr. ,,
0·02 (1/50) Cc. = 0·1 (1/10) Mgr. ,,
0·04 (1/25) Cc. = 0·2 (1/5) Mgr. ,,

To convert the above 'Bacillary Substance' stated in decimal part of a milligramme into decimal part of a Gm., carry the decimal point three places to the left. Thus 0·00005 Mgr. = 0·00000005 Gm.

Dilutions are best made with 0·8% Sodium Chloride and 0·5% Phenol. A 1% Dilution of the original is sometimes called "Dilution No. 1," a 0·1% Dilution is No. 2 and so on. It is not used as a diagnostic.

Bold Dosage (*c.f.*, p.888), was advocated by the German school. Starting with the same initial dose (0·00001 to 0·00002 Cc.), at one or two days' interval, the dose was rapidly increased from twice to five times the dose at each injection, until definite reaction appears with a rise of 2½ to 5° F. in temperature. As soon as such violent reaction develops much longer pauses, 6—8 days, were made. The injections were increased until the dose reached 4 Cc. of the undiluted B.E. Koch regarded the immunisation as complete only when the patient could tolerate this injection without reaction. The larger doses of 2 to 4 Cc. were only injected at intervals of 2 to 4 weeks.

Sir A. E. Wright uses 'B.E.' in his "Opsonic Treatment" in exceedingly small doses. It is applicable to the treatment of chronic, strictly localised and apyrexial tubercular infections. In exceptional cases (***English dosage***) the initial dose may be as minute as 1/1,000,000 mgr. bacillary substance with gradual rise—the limit being—1/500 mgr. Bacillary substance (=0·0004 Cc.). *Average doses* are respectively, 1/20,000 mgr. (=0·00001 Cc.), 1/5,000 mgr. and 1/2,000 mgr. diluted in 1 Cc.

Papular eruption following the injection of 'B.E.'—A. J. M. Grant, L.ii./18,15.

I.K. (Immune Körper) Tuberculin.—*Syn.* Spengler's Tuberculin manufactured at Davos (Switzerland).

The preparation is stated to have an antitoxic action, neutralising the poison of the bacillus and a lytic action which impairs or destroys the vitality of the bacteria. It contains besides immune bodies against the T.B. and other organisms associated with it.

Dose.—1 Cc. of 1 in 10 million dilution of the preparation gradually increased (to 1 in 1 million, 1 in 100,000, etc.), to 1 Cc. of the preparation; the diluting fluid being sodium chloride 0·5 Gm.; Lactic Acid (sp. gr. 1·2) 1 to 2 drops, Distilled water to 100 Cc.

According to Spengler the red blood corpuscles (not the serum) are the site of production and collection of the protective substances in a number of infectious diseases, *e.g.*, in tuberculosis. This suggested the use of tubercle-immune blood obtained from rabbits immunised against strains of human tubercle bacilli. A vein of the animal is punctured and the blood received into Carbolised Saline Solution containing Lactic Acid. The treatment is, therefore, a 'passive-active' immunisation.—Pres., 1913,317. See also Treatment of Tuberculosis by W. H. Fearis (John Murray) and L. i./12,194.

Laryngeal Tuberculosis treated with various Tuberculins including 'I.K.,' 'P.T.O.' and Old Tuberculin, with remarkable results.—W. Camac Wilkinson.—B.M.J. ii./10,1705, *c.f.* Tuberculin Dispensaries.

Beraneck's Tuberculin consists of a mixture of tubercle-broth filtered free from bacilli and concentrated *in vacuo*, with an extract of the bacilli made with phosphoric acid.—Pres., 1913,311. Beraneck's Tuberculin is the only one favoured by Sahli.—L. ii./12,1224. It is stated to contain exotoxins and endotoxins and acts like a vaccine, strengthening the bacteriolytic power of the protective cells; it also exercises a bactericidal or attenuating effect on the Tubercle Bacillus.—Pres., 1910, 17.

It is supplied in 6 dilutions T.Bk_1, to T.Bk_6. *viz.*, 1 : 10 to 1 : 1,000,000 for use.

Bronchial asthma with suspicious signs of pulmonary tuberculosis well treated.—Wien. Klin. Woch., Jan. 12, 1913; Pres., 1913,311.

Turtulin is the name given to an emulsion of living Tubercle Bacilli made from the bacilli of cold blooded animals, especially turtles. **Turtle Tuberculin** is a tuberculin prepared from the same animals. They are said to be non-toxic.

TUBERCULIN DISPENSARY TREATMENT.

W. Camac Wilkinson read a paper at the B.M.A Meeting, 1910 (see B.M.J. ii./10,1055),in which he criticised 'Sanatorium treatment.' He is strongly in favour of Tuberculin—there being, in his opinion, only one contra-indication, viz., despair. He reviewed the contra-indications usually accepted and pointed out that Tuberculin acted like magic in cases of hæmorrhage, apart from complications. Hæmorrhage might be the first sign of a mixed infection, in which case Tuberculin would be contra-indicated, but by the mixed infection, not by the hæmorrhage. In his view Tuberculin treatment is analogous with the use of Haffkine's Fluid or similar agents in plague, cholera or typhoid. Tuberculin never failed when Sanatorium methods succeeded. In the first stage pulmonary tuberculosis could be cured with certainty by Tuberculin, in the second permanent results are obtained in 40 to 60%of cases. (Before this C. Wilkinson had advocated the use of Tuberculin preparations within and without Sanatoriums in 1902 and in 1907,—*c.f.*, B.M.J. i./11,1298.) A further paper dealing with laryngeal tuberculosis is given.—B.M.J. ii./10,1705. In this some remarkable results are described. A large variety of Tuberculins—Old Tuberculin, 'T.E.' (=New Tuberculin Bacilli Emulsion), 'P.T.O.', 'T.O.A.' and 'P.T.'—are mentioned as having been used in various cases. Only early or suspected cases are suitable for this form of—Dispensary—treatment. The treatment should be refused to all presenting evidence of mixed infection. Tuberculin Dispensaries established in various places—Aldershot, Street (Somerset), Irvine, and others proposed both for treatment and diagnosis in case of contacts.—(Leader). B.M.J. i./11,265.

Details of the 'Tuberculin Dispensary League'—the chief Dispensary being at 263, Kennington Road, London, S.E. It is estimated that about 40,000 persons suffer in London from consumption and cannot obtain Sanatorium treatment, which can only deal with about 1,000 a year.—B.M.J. i./11,287,340.

Enquiries from those in charge at Sanatoria not in favour of Tuberculin Dispensary treatment. 'If an individual who has developed pulmonary tuberculosis to such a degree as to show clinical manifestations continues to exist under conditions which primarily rendered his cells incapable of overcoming the attack of the bacillus, the tendency will be for his cell resistance to continue to diminish. 'Remove the individual from the conditions.' Administration in a Dispensary not possible. Question of autoinoculations also dwelt on as impracticable.—Pringle, B.M.J. i./11,298.

Reply by C. Wilkinson :—'Sanatoria can only deal with about 5% of cases among the poor.'—B.M.J. i./11,403.

Use of Tuberculin should be carefully safeguarded,—not applicable indiscriminately. Routine treatment not possible.—R. W. Philip, B.M.J. i./11,466.

A study of many communications on this subject *vide* Edition XV., p. 933 for references, showed an extraordinary lack of detail as to (1) *which* Tuberculin is used or to use; (2) *Dosage.*—In several instances the dose is given in fractions of a Gram, *e.g.*, ‘0·005 Gm. of Tuberculin’ (B.M.J. ii./11, p. 635). This of course can mean a variety of different things and amounts of them. C. Wilkinson has issued a book in which his method of dosage is given. We gather from a study of his papers that his usual treatment is *first a course of ‘P.T.O.’, then ‘P.T.’ (may be repeated courses), then Tuberculin Old—or more recently Tuberculin ‘A.F.’*

“*The dosage (at the Portsmouth Municipal Tuberculin Dispensary) is approximately as follows:—First dose of ‘P.T.O.’ is from* 0·00025 *to* 0·005 *Cc.—increased gradually to* 0·5 *or* 1 *Cc. When this has been reached without reaction (over* 100° *F.) P.T. (which is said to be* 40 *to* 50 *times as powerful as P.T.O.) is given, i.e., after* 0·5 *Cc. of ‘P.T.O.’ the usual dose of ‘P.T.’ will be* 0·01 *Cc. until* 0·5 *to* 1 *Cc. is taken without reaction, when a short course of Old Tuberculin with a maximum of* 0·5 *to* 1 *Cc. is injected.*”

Municipal Tuberculin Dispensary Treatment.

A. M. Fraser and H. Clark reported cases. After experience with P.T.O—P.T. and Old Tuberculin it appeared preferable, in some cases, to employ either ‘A.F.’ at an early stage or Bovine B.E. It is important to secure tolerance to a large dose of Old (Human) Tuberculin—of this generally 1 Cc. is given before discharging a patient. Doses given at interval of three to seven days.—L. ii./12,289.

C. Wilkinson claims good results in his dispensary with large doses. In strong favour of Tuberculin Dispensaries. Sanatoria cannot show same percentage of successes. Dispensary overwhelmed with applications.—B.M.J. ii./12,401,661,1080.

Treatment of 29 cases with C. Wilkinson’s method starting with P.T.O. going up to 1 Cc. of this then changing to P.T. (which is clinically about 50 times stronger). When 1 Cc. of this is reached without reaction, treatment ceased—case to be seen in 4 or 6 months time to be tested. Small doses are of little value. Diagnostic value of Old Tuberculin is great. Every individual who gives a + reaction to it should be treated until he ceases to react to a dose of 0·05 of T.A.—L. D. Parsons, B.M.J. ii./12,959; L. ii./12,446.

Over 70% of the patients are able to continue their usual avocations while under treatment. A number of medical men certify good results by C. Wilkinson’s Dispensary Treatment.—B.M.J. ii./12,100,339. See also Pr., Jan., 1913, 152. Results in 100 cases in 1912.—B.M.J. i./14,804

Normal Horse Serum.—*Syn.* **Antilytic Serum, ✱Antilusin.** (T.M. 310899). Horse Plasma (Liquid) is supplied in 10 and 25 Cc. vials. *Dose.*— 1 to 2 drachms. Employed to increase the amount of “complement,” according to Ehrlich’s theory. In tuberculosis has been recommended as an ideal food, also in typhoid; the horse is immune to the former disease. Sheep’s plasma is equally satisfactory.

(**Byno-plasma** contains 1 drachm sheep’s plasma in every ½ ounce —Paton.—B.M.J. ii./08,441.)

A dose of tuberculin in 10 Cc. of Normal Horse Serum is less likely to cause the rise of temperature than the same dose in 10 Cc. of Saline.

Treatment of Chronic Gastric and Duodenal Ulcer.—The serum is given by the mouth 3 or 4 times daily directly after food in ½ ounce of water. 60 or 80 Cc. may be given in 24 hours. The serum must be fresh or serum deprived of its globulins thus rendering its antilytic value artificially increased. A fair idea of the potency of the Serum can be gained by observing its action on an old long-standing wound—if it does not produce a good reaction in 24 to 36 hours it is useless for the purpose.—E. C. Hort. B.M.J ii./08, 1081.

"**Antilusin**" '**A**' for use *per os*. and "**Antilusin**" '**B**' for local application are preparations of this kind.

Ulcers, superficial, do well with a dressing of sterile gauze soaked in sterile Normal Serum.—B.M.J. i./10,77. See also B.M.J. i./10,360.

Hæmophilia treated by horse serum.—L. ii./09,149.

In treatment of gastric and duodenal ulcer should never be given to starving patients or on an empty stomach. In chronic cases 10 Cc. three or four times a day for a month immediately after food in ½ ounce of cold water is best. It should be stored in a cool place (preferably on ice). After a month gradually drop the treatment. **Serum** of the **Sheep** gives as good result as of the horse. Full details as to diet and treatment of cases according as to whether hæmorrhage has occurred or not, etc., is provided.—E. C. Hort. B.M.J. ii./10,1903.

The scope of Normal and Immune Serum in Treatment.

It must be remembered that the utilisation of an individual's own serum has been practised from time immemorial,—whenever artificial hyperæmia has been set in motion by light or heat baths, by poultices and stupes, by Bier's treatment, stimulating lotions and liniments, by painting the skin with Iodine, by blisters, etc., there this form of artificial normal serum therapy has been in use. There is no doubt that Normal Horse Serum exercises at times a powerful stimulus to increased resistance in some infective processes.

There are at least three forms of Artificial Serum-Therapy.—(1). The injection of Vaccines into man. (ii). The injection of Vaccines into Animals. (iii). Man vaccinates himself. In the first man makes his own antibodies; in the second when an animal is vaccinated antibodies are produced first for its own use and then for man's; in the third a man vaccinates himself with Vaccines residing in his own body,—we call this process autoinoculation because the source of Vaccine is his own infected tissues. In all three cases the object of vaccination is identical—the production of immune serum. Normal Horse Serum is advocated in diseases including ulceration of the stomach and other organs, various kinds of purpura, pernicious anæmia, etc. By intravenous or subcutaneous injection Normal Serum was of great value in arresting hæmorrhage in severe cases of true hæmophilia and of some forms of purpura, the results being attributed to acceleration of coagulation time.—B.M.J. ii./11,667.

The autolytic liquid obtained from Pig's Liver has an antitoxic action. It is said to render harmless a dose of solution of Strychnine, which would normally be fatal in five minutes.—P.J. ii. 11,407.

A case of direct transfusson of blood for secondary hemorrhage by Crile's method. Patient had lost a large amount of blood through a wound with an adze, with result that blood count showed 2,850,000 red corpuscles with 40% hæmoglobin. Transfusion from radial artery (left) of the donor to the cephalic vein of patient just above bend of the elbow (left) resulted satisfactorily.—Can., Jl. Med., Apl., 1911.

Coagulose.—A dried preparation of normal blood serum containing the fibrin ferment required to coagulate blood—used in hæmorrhage by hypodermic injection after dissolving in water.

Haemostatic Serum. *Syn.* **Haemoplastin.** *Dose.*—1 to 2 Cc. injected intravenously or subcutaneously and repeated every 4 to 6 hours until hæmorrhage controlled. A serum derivative stated to promote clotting of the blood.

Calmette's Ophthalmic Reaction.—As a method of diagnosing tuberculosis, Calmette advocated dropping a small quantity of Tuberculin into the eye (in preference towards the inner angle), the lids being kept apart a moment. A 0·5 to 1% Old Tuberculin (precipitated by Alcohol 95%) in distilled water is used. In a healthy subject no reaction follows. In a tuberculous patient, after three to five hours or more there is congestion of the palpebral conjunctiva, which assumes a red colour and the seat of more or less intense œdema. At the end of six hours, filaments of fibrinous secretion may be seen in the conjunctival cul-de-sac. This disappears after 18 hours in the child and after from 24 to 36 hours in the adult. The reaction is now little used—it is thought to be dangerous.

Rhino-Reaction or Nasal Test. Apply 1% Dilution of Calmette's Tuberculin on a gauze swab, to the lower turbinate or septum for about 10 minutes. The reaction consists in the appearance of an exudate at the point of application—in 18 to 48 hours preceded by congestion of the mucous membrane. The *lobe of the ear* has also been suggested as place of observation.

Von Pirquet's Cuti-Reaction, Cutaneous Tuberculin Vaccination, *i.e.*, by making two small scarifications in the superficial layers of the skin through two drops of Old Tuberculin diluted with an equal volume of 5% Phenol in Glycerin and twice its volume of normal Saline Solution (*vide* also below), has been found diagnostic by Von Pirquet. A small red papule develops in twenty-four hours if patient is tuberculous.

The test is of value in *infants*, of less in the second year and none in adult life.—Hamman and S. Wolman, L. ii./13,150.

In older children it gave some astounding figures as to prevalence of tuberculosis. Escherich provides important data, *vide* p. 898.

Undiluted Old Tuberculin is also used :—

Method of Use.—Cleanse the skin of the inner side of the forearm with Ether and place two separate drops of *Undiluted* Old Tuberculin on the skin about 4 inches apart. A scarification of the skin is then made, first as a control between the two drops of Tuberculin, and then successively in each of the two drops. A few shreds of cotton wool are placed on the drops to prevent them dripping off. After 10 minutes the cotton wool may be removed.

Effects of the Reaction.—At first there is no difference between the vaccination and control punctures,—this is called the (non-specific) traumatic reaction. A small papule is then seen soon surrounded by a red areola, which disappears again after a few hours. There remains a small only slightly raised redness, in the middle of which, at the point of perforation of the epithelium, a papule of the size of a pin's head is formed. The redness of the surrounding part is generally still seen after 24 hours. The vaccination punctures with a negative reaction respond like controls, except that they appear swollen during the first 24 hours. The determination of minute specific reactions is not easy ; at first it would be well to consider reactions of less than 5 m.m. diameter as dubious, and in such cases to repeat the vaccination, as a repetition increases the signs of a positive reaction.

In a *positive reaction* the first few hours pass without any specific action. It is usually from three hours to several days before the specific red areola begins. In most cases the reaction is fully developed after 24 hours. If not seen in 24 hours the reaction is "torpid."

Sometimes the normal redness does not appear, so that the papule can only be recognised by the sense of touch or by being illuminated sideways.

The edge of the papule is sometimes rounded off, sometimes dented, and in exceptional cases long shoots in the direction of the lymph cells appear. The height of the reaction is generally reached in about 48 hours.

Intense reaction employing undiluted Old Tuberculin, which cleared up on use of Horse Serum applied locally on gauze—used in treatment for tuberculous ulcers.—L. ii./10,60.

Von Pirquet gives the following figures, of 747 children tested : 130 were clinically tuberculous of whom 113 (87%) reacted positively. Clinically non-tuberculous 572 of whom 104 (20%) reacted +. Doubtfully tuberculous 115 of whom 56 (48·6%) reacted, but there was difficulty in interpreting. The older the child the less valuable the result.—L. ii./10,1747.

In erythema nodosum the skin gives a marked Von Pirquet Reaction. This does not convey that erythema nodosum is a tuberculous condition which has been suggested.—B.M.J. ii./11,203.

Von Pirquet Test in 20 cases of children not convincing.—B.M.J. i./12,217.

Human and Bovine Old Tuberculin employed in the Von Pirquet Test Method both gave reactions varying within wide limits. The quantitative test found of no value. Reactions invariably in patients from whose pus T.B. had been isolated but it was not possible to determine the type of bacillus from which patient suffered by using the different tuberculins.—H. J. Gauvain, —L. ii./17,519.

Tuberculin as diagnostic an important aid—the stirring up of an existing focus is a valuable aid enabling one to localise the trouble.—E. H. Coleman. B.M.J. ii./16,37.

Papillary Cutaneous method (P.C.) and multi-papillary cutaneous (M.P.C.) employing dilutions of P.T.O. (earlier T.R. was used but it gave such high reactions that it was discarded in favour of P.T.O. as being safer). Cases divided thus: mark 'I,' using undiluted P.T.O., II. 1 in 10, III. 1 in 100, IV. 1 in 500, V. 1 in 1000, VI. 1 in 10,000. Diluent normal saline with ½% Phenol. A case reacting above II. requires proof that it is not active tuberculosis.—H. A. Ellis, L. ii./16,638.

Morland's Quanti-Pirquet Test.—Four dilutions of Old Tuberculin are used, 1, 4, 16 and 64%. Four scarifications are made on the arm and a drop of one dilution applied to each. The **diameter of the papules formed** is measured in millimetres and the figures may be charted according to a table or represented graphically in a diagram. The result is more largely determined by the *relative* rather than the actual size of the papules The figure 100 represents the sensitiveness of a patient who reacts to 1% Tuberculin. One who reacts to 0·1% has sensitiveness 1,000. Figures below 100 indicate absence of actual disease.—E. C. Morland, L. ii./12,688; B.M.J. ii./13,531.

Bandelier and Roepke's Subcutaneous Method.—Dilutions of Old Tuberculin or 'A.F.' are made of strength 1 and 0·1% using 0·5% Phenol—*both* are required.

Dose.—0·2 Cc. of the 0·1% dilution. If no reaction give 1 Cc. of the same dilution after three days. If no reaction give 0·5 Cc. of the 1% dilution. If this fails to produce and reaction the case is negative. Children half these amounts. The injection is made into the region below level of the shoulder blades alternately on the two sides, or into the upper arm. Best conducted in the afternoon as the reaction is rapid and must be observed next day. Temperature of the patient is observed and the injection made when same is normal three days.

The reaction may be rise of temperature, disturbance of general well-being, local reaction at site of injection or focal. These may appear all together or partly combined. Advanced cases may not react at all.—Pres., 1913,321.

By subcutaneous injection of Tuberculin (**Escherich**) a positive reaction was obtained with 94% of children between 11 and 14 years of age. Supplementing this with data from post-mortem examinations, the conclusion is that the vast majority of humanity, at any rate in Europe, become infected with tuberculosis years before they grow up. Von Pirquet's Reaction is of no value except in infants. In infants latent or stationary tuberculosis is rare, *and up to the age of two years a positive reaction is strong presumptive evidence in favour of an active tuberculous lesion.* With regard to later ages (11 to 14) result must be viewed in conjunction with physical signs and the course of the case,—the Von Pirquet Diagnosis is, therefore, of particular value in such when it is a negative reaction.—B.M.J. ii./11,1311.

Tuberculin Reaction after blistering,—De Carle Woodcock.

Old Tuberculin in capillary tubes for diagnosis by application to a denuded surface obtained by blistering the skin and removing the raised epidermis. A control blister is applied some distance apart without Tuberculin. Positive reactions are stated to be clearly defined. Watch for red coloration.

Tuberculin Ointment (E. Moro).—**As diagnostic test.** Old Tuberculin 1, mixed with Anhydrous Lanolin 1. Warm the Lanolin slightly—to 20° or 30° C. to assist in mixing. (Even with this the Lanolin will barely incorporate an equal amount of Tuberculin.—W. H. M.). A piece the size of a pea is rubbed for about ½ to 1 minute on the upper arm over a space about 2 inches in diameter, this produces within a day or so a temporary rash, papule or pustule. Or the test may be applied to the abdominal wall or to the chest near the nipple. It is the least dangerous method.—*C.f.* L. i./10, 73; *v.* also B.M.J.E. i./09,17.

A control of Lanolin is used on the other arm. It is not to be used on scrofulous children—on account of danger of spread of eruption.

In the knowledge of the writers Von Pirquet's Test (from the same batch of solution) was applied simultaneously on a patient in a severe condition, and on a healthy individual. The response to the test in the first case was most marked, whilst in the healthy person reaction was nil.

For the Serum Diagnosis of Tuberculosis see Vol. II.

Typhoid Fever, Anti-Typhoid Inoculation.

(For general preventive use **Anti-typhoid Tablets** (*q.v.*) are suggested). The fact that in China enteric fever in epidemic form rarely occurs is, according to one authority, due to the fact that the Chinese drink tea, (which implies boiling water) instead of water, congee instead of milk, and that uncooked food is seldom taken.

In the war each nation initially employed for immunising purposes preparations of the *B. Typhosus* alone without realising the importance of the **Paratyphoid** organisms.

The vaccine had to be amended to include the latter when the overwhelming preponderance of Paratyphoid infection was realised. W. H. Willcox (L. i./16,454) for example in detailing his experience in the Dardenelles Area of a large number of cases states that while Typhoid cases were 13·5%, Paratyphoid constituted 86·5%. The Paratyphoid on subdivision gave 'A' 47·5% of total, 'B' 29% and non-agglutinable Paratyphoid 10%. In fact the Paratyphoid cases were in his judgment considerably more than 6·4 times as numerous as the cases of typhoid. In arriving at the 86·5% (122 of the 144 cases analysed) this percentage concerns the first 141 cases from which the organism was isolated from the blood and about which there could be no question as regards diagnosis. In this paper details are given as to the discovery of the organisms, agglutination reactions, clinical symptoms of the fever (division into three groups) and prophylaxis. It is stated that in normal times paratyphoid has been a relatively uncommon disease. Muir and Ritchie for example say (Manual of Bacteriology, 1913), of cases presenting clinically symptoms of typhoid that only 3% were probably paratyphoid. R. W. Allen (Practical Vaccine Treatment) points out the Paratyphoid infections in the Boer War were very much more prevalent than commonly believed. He adds that fortunately the virulence of the paratyphoid organisms is much lower than that of *B. Typhosus* or thousands of lives would have been thrown away. It has been found as one of the lessons of the war that the actual presence of an epidemic or the impending entrance of the inoculated into a zone of infection was no contraindication whatever to prophylactic inoculation.

The immunity created in prophylactic inoculation with this 'T.A.B.' Vaccine remains at a high level for at least six months—probably for twelve months, and should an inoculated person contract the disease its course is profoundly modified, its severity is materially diminished and the percentage mortality rate is lowered.

With regard to diagnosis the findings of the Widal Test had to be corrected—a single positive test being of no value but a careful study of the agglutination curve for the several organisms was proved to be essential for correct diagnosis.

The immunity resulting from the simultaneous use of the vaccines of three or more organisms is at least as good as that produced by the use of the several individual vaccines, a suitable interval being left between the administrations of each.

(It may be mentioned that the Antityphoid Vaccine No. 2 of the Wimpole Institute containing Typhoid and Paratyphoid A. and B. was available to the medical profession as far back as 1908 and has been described in this work continuously since the XIVth (1910) edition).

Typhoid Vaccines.—Wimpole Institute (*see also* ***Sensitised Vaccines***) are supplied in the following forms :—

For Immunising :—

No. 1. Agar cultures of Typhoid and Paratyphoid 'A' and 'B' organisms.

No. 2. Broth cultures of Typhoid and Paratyphoid 'A' and 'B' organisms. Ampoules of both contain 500, 1000 and 2000 millions of each organism.

Special care is taken to ensure little or no diminution in their potency at the end of at least 12 months.

These doses either of the Agar or Broth Cultures should be given in series at intervals of not less than 7 days ; the interval of 10 days is to be preferred. An interval of 14 days is even better. The dose is given *subcutaneously* into the tissues of the upper arm just below the insertion of the deltoid.

For children the dose may be on the lines of Gaubius' Dose Table. Thus a child of 7 would receive 1/3 average dose.

According to a report to the Medical Research Committee by G. Dreyer, A. Duncan Gardner, A. G. Gibson and E. W. Ainley Walker —(see L. i./18,498)—on Prophylactic Typhoid plus Paratyphoid inoculation (T.A.B. vaccine) 1000 million Typhoid and 750 million each 'A' and 'B' per Cc. should be given in doses of 0·5 and 1 Cc. as first and second dose to ensure protection. The interval between the first and second dose should be lengthened from 10 days to 18 or 20 days.

Technique Rub the area with antiseptic solution. A good fold of skin and underlying subcutaneous tissues is lifted firmly between the left thumb and forefinger and the needle plunged boldly and quickly to the depth of *about an inch*, the tissues released and the injection given slowly into the tissues. The puncture may be touched with weak antiseptic or dried and a little collodion applied.

The patient should take no alcohol whatever during the 24 hours preceding and after the injection.

Contraindications.—Alcoholics react more strongly than others. Kidney disease requires caution and there is possibly slight risk in the case of old standing tuberculosis.

Effects.—Tenderness at the place of inoculation is at its worst in about 18 hours. Redness may be caused. Give free use to the arm the day after injection. Malaise begins in about 6 hours. Occasionally a rigor. There is usually headache and a slight degree of pyrexia. Occasionally temperature up to 101° F., rarely 103° F.

Castellani's Tetravaccines : Typhoid + para-Typhoid "A"+ para-Typhoid "B"+Cholera ("T.A.B.C.") also the same with M. Melitensis in place of the Cholera Vibrio ("T.A.B.M.") and his **Pentavaccine** (Typhoid+para-Typhoid "A"+para-Typhoid "B" +Cholera+Malta Fever) have been considerably used. Experiences with T.A.B.C. and T.A.B.M.C. in Serbia. Inoculated persons developed antibodies to the diseases named.—G. A. Lurie, B.M.J. i./16,45.

The same worker's **Hexavaccine :** Typhoid, 500 million, Paratyphoids "A" and "B" 250 million each, V. Cholera 2000 million, B. Pestis 500 million and M. Melitensis 2000 million per Cc. (T.A.B.C.P.M.) with an initial dose 0·5 Cc. and double the amount a week later—is thought to be still in the experimental stage—experiments will be continued. This if found efficient would constitute the ideal vaccine for use in the tropics.—B.M.J. ii./17,357. For earlier papers see B.M.J. ii./13,1577 ; i./15,758 ; ii./15,711.

Combined preventive inoculation against typhoid, paratyphoid and bacillary dysentery. Dysentery vaccine completely sensitized with a heated polyvalent dysentery serum.—G. P. Johnson and A. J. Milne, B,M.J. i./16,88.

Results of inoculation against typhoid over a period of years. Eloquent proof of the value of inoculation.—Pr. McWeeney, L. i./15,265.

Incidence of Typhoid among the inoculated is only 0·2%, among the uninoculated it is 30%. Strength of prophylactic injection usually 1000 million folllowed by 2000 in 10 days.—F. C. Madden, L. ii./15,271.

Paratyphoid organisms have not the same limited affinity for the lymphatic tissue of the intestine as the *B. Typhosus* but tend to produce lesions in various parts of the body—respiratory system (rhinitis, pharyngitis, etc.) alimentary (gastritis, enteritis, colitis, etc.), urinary (nephritis, etc.), skeletal (osteitis, synovitis) and so on. Clinical cases.—C. H. Miller, L. i./17,747.

Paratyphoid Infections. Various types described: Dysenteric, Biliary, Nephritis and other urinary affections, Rheumatic, Bronchitic, etc., Influenzal and Septicaemic. Laboratory diagnosis. In treatment general hygiene essential. Antiseptic alkaline mouth-washes preferable (avoid those containing glycerin). Promote flow of saliva by making patient chew (chewing gum, biscuits, etc.)—C. H. Miller, L. i./17,827,901. See also Clinical characters. —H. Robinson, L. ii./15,851.

A new germ of Paratyphoid.—L. Hirschfeld, L. i./19, 296.

Triple typhoid vaccines made in the Laboratories of the Roy. Nav. Med. School, Greenwich, with results.—L. i./19,145.

Vaccines for treatment.

No. 3. of the Wimpole Institute comprises Agar cultures of the several organisms.

Dose.—50, 100, 250, 500, 1000 and 2000 millions. An initial dose of not less than 250 millions can be safely used—these to be repeated or increased under guidance of the clinical signs and symptoms. It might be of value to give a vaccine of *B. Coli* and *Streptococci* to raise the immunity against these organisms before they can take an active part in the process of destruction of the tissues (as in the later stages of typhoid).—Practical Vaccine Treatment.

Stock Typhoid vaccines supplied by the R.A.M. College. Results in 50 cases. Give early 250 million. Interval three days. Second dose 375 million, third 500 million. Then add 250 million each time. Reduce if marked toxæmia or hyperperexia or lung complications.—A. W. Wiltshire and A. R. N. MacGillycuddy, L. ii./15,685.

The stock army vaccine used in 230 cases of B. Typhosus Infection. Results disappointing. In 29 there was a definite good influence, but of those 20 were 'good' cases prognostically. In the cases requiring help the physician is disappointed. Fever not shortened. Stock vaccine not recommended.—T H. Whittington, L. i./16,759.

Intravenously 50 to 250 million suitable dose.—Jobling and Petersen, Jl. Am. Med. Assn., June 3 and August 7/1916.

LIFE CYCLE OF BACTERIA.—Bacteria reproduce themselves in other ways than by simple binary fission. The life cycle in some cases includes an invisible or nearly invisible phase. Certain pathogenic bacteria are shown under certain conditions to give origin to viable and vegetative forms so minute as to come within the category of filterable viruses. Experiments with Typhoid, Paratyphoid and Dysentery Organisms. A paper with excellent microphotos.—E. C. Hort, B.M.J. i./17,571.

Earlier References.

Lincoln epidemic of 1905, no anti-typhoid inoculation was tried.—W. W. W.

TYPHOID CARRIERS *vide* Vol. II.

Living Attenuated Vaccine containing living typhoid organisms (attenuated by heat at 50° C.) gives a higher degree of immunity than the use of dead organisms. Antityphoid vaccination is well conducted by inoculation of ½ Cc. of the usual dead vaccine (Wright) and one week after 1 Cc. of live vaccine. There is no danger, and both vaccinations may be with live cultures. —A. Castellani, Colombo.—L. ii./09,528; see also L. ii./09,1884. This live attenuated Vaccine is harmless (given subcutaneously). The strain of organisms should be non-virulent but rich in antigen as determined by animal experiments. In man the immunisation obtained by two inoculations of this or any dead vaccine is never complete—it is only partial. In countries where Paratyphoid A. and B. are endemic besides typhoid fever, Mixed Vaccine is best.—A. Castellani, L. i./13,595.

Preparation and keeping properties of Antityphoid Vaccines. The sterilisation of a Vaccine may be done by heating at 60° for twenty minutes, or at 50° for 1 hour. This kills the living culture, and the addition of 0·5% Phenol. 0·25% Lysol preserves from possible subsequent contamination. The sterilisation with the Phenol is efficient,—heating is not desirable. Vaccine with the addition of Phenol 0·5% retains its power for two years.—L. ii./09,436

Heating an Antityphoid Vaccine in order to sterilise it diminishes its immunising properties and curtails its keeping properties. Carbolic Acid 0·5% would appear to be the best agent with which to sterilise,—it obviates any necessity for heating.—Annus Medicus.—L. ii./09,1884.

A case of suspected pneumonia following on typhoid showed large numbers of *B. typhosus* in the sputum with absence of the pneumococcus. Consolidation of both bases and a pleuritic rub were evident upon auscultation. Temperature of 105·4° F. reduced to 99° F. in 30 hours with uninterrupted recovery after dose of 50 millions of patient's own typhoid organism.—R. W. Allen, Polyclinic.

Sir D. Semple on the Vaccine Treatment of Typhoid.—The appearance of protective substances in the blood of a typhoid patient is the result of nature's effort to get the upper hand of the infection. This natural response to infection during the course of the disease corresponds to the response which takes place when a prophylactic inoculation is carried out, *viz.*, an increase in the agglutinating power of the serum, an increase in bactericidal substances and an increase of opsonins, and possibly other changes as yet uninvestigated. The use of Vaccines depends on the reaction they set up in the tissues and the consequent production of bacteriotropic substances. The local elaboration of antibodies by the subcutaneous injection of antigens in this manner is not, however, universally accepted. Semple reports on 60 cases with two deaths and two relapses. With few exceptions the temperature was lowered and there were no *sequelæ*. In one case the infection was mixed *B. Typhosus* isolate from the blood early and *B. Paratyphoid A*. from the urine and fæces when convalescence was setting in. Dosage varied from 6 to 50 millions in earlier cases and 50 to 100 millions in more recent ones. Most had from 4 to 6 doses.

Diagnosis is best by direct culture from the blood. Autogenous Vaccine can then be produced by the next day or in 48 hours. Give stock Vaccines meanwhile. Sir D. Semple, Jl. Vacc. Therap., Feb., '12.

Interspacing of doses.—Some cases did well on daily doses Medium dosage, say 100 millions may be given to begin with gradually increased to 200 or 300 millions with interval of 24 to 48 hours between each dose.

The Vaccine treatment seems to make average cases mild, severe cases into average and only the very worst cases are not favourably affected. Clinical improvement five days after a dose of 2 millions. Fall of temperature and return of appetite. Four millions as second dose, subsequently the plan was to give half the initial dose as the second dose. Second injection made on the fourth or fifth day, *i.e.*, as soon as the improvement after the first injection began to pass off and every subsequent fourth or fifth day till convalescence is established. Reviewing 22 cases the conclusion is—if the case is severe and especially if of the cerebral type with muttering delirium, give half the ordinary initial dose, *i.e.*, 1 million for an adult. If patient not unduly ill and especially if admitted within the first fourteen days give two million.—F. J. Sadler, Q. Jl. Med., Jan., 1912.

Avignon epidemic, Antityphoid Vaccination in.—Not a single case occurred in the garrison amongst those vaccinated.—L. i./13,48.

Antityphoid Committee's Report—Strongly advises the practise of Antityphoid Inoculation in the Army on voluntary basis. Its imperative necessity.—Sir W. B. Leishman, B.M.J. ii./14,369,408; Rapid technique for Army work, *ibid*, 470,483; Technique, *ibid*, 640.

Experiments showed that Vaccines quite freshly made, *i.e.*, less than three weeks old, give rise to local and constitutional symptoms more marked than customary. Inoculations should be made some 4 to 6 hours before bedtime for the sake of rest at time of the reaction.—L. i./13,1477.

Two cases of **Paratyphoid B. Infection** treated with Vaccine prepared by cultivating from the fæcal material on Conradi Drigalski medium (*q.v.*) and killing the organisms by heating 45 minutes at 58° C.* In this way Vaccine is ready in 48 hours.—W. M. Crofton, B.M.J. ii./13,1373.

Vaccination, Vaccine, Glycerinated Calf-Lymph. Vaccinum. P. Belg., as prepared at the Veterinary College of Brussels.

"Cowpox, or rather the artificially inoculated form of the disease termed *vaccinia*, is nothing more nor less than *variola* modified by transmission through the bovine animal."—Encyclopædia Britannica, to which S. Monckton Copeman contributes the article on Vaccination. For an abstract of the monograph dealing with the objections urged to vaccine lymph, the needs for efficient vaccination, etc.—*Vide* L. ii./11,1504.

Re-Vaccination.—Papules not going on to vesiculation show positive and normal results of the lymph on patients still more or less immune through previous vaccination.

Renner's Vaccine is free from pathogenic organisms, and there is no danger in using it no matter how old it is. It has been frequently found good and active on testing it eleven months after having taken it from the animal.

Glycerinated Calf Lymph has advantages over that obtained even from healthy children (as used in the past). Vaccination at the time of infection with a small-pox may probably modify the disease, as the incubation period of vaccinia is 4 days, whereas that of variola is 12 days. Attenuation by passage of the organism through an animal of greater resistance to the disease than man is known as '**Jennerisation.**' The danger of imparting infections and other human disease is absolutely avoided, and there is but slight risk of communicating any disease peculiar to the cow. The place of insertion should be small, otherwise the reaction is too great. The amount of protection afforded seems to be greater than that afforded by humanised lymph. Glycerinated lymph is recognised as the safest lymph for vaccination, and by the VACCINATION ACTS AMENDMENT ACT, 1898, it is enacted that if a child has not been vaccinated when four months and one week old, the public vaccinator of the district shall visit the home of the child, and shall offer to vaccinate the child with Glycerinated Calf Lymph free of charge.

Germany has a law which enjoins Vaccination and Revaccination (made compulsory in 1874). Smallpox has been practically stamped out there. The total deaths for 10 years (1898 to 1908) in Germany in a population of over 62,000,000 never in one year reached 100,—the highest number was 65 in 1908. ***During the same decade in different years we had 600, 700 and 800 deaths out of a populaton of 44,000,000.*** Practically no steps in Germany are taken to provide small-pox hospitals,—in London there are hospitals with bed accommodation for 2,000 or 3,000 patients. There is danger of difficulty of diagnosis between small-pox and chicken-pox. Many medical men have had no opportunities of seeing small-pox, and they are therefore not familiar with it. ***25% of the children are not vaccinated.*** When these grow up the danger of an epidemic will be increased. Futility of the conditions under which conscientious objectors' certificates of exemption can be obtained.—Dr. Hillier, from a Parliamentary Debate on Vaccination.—B.M.J. i./11,955.

Suspected Small-pox.—**Methods of Examination** based on methods employed at the Metropolitan Asylums Board Receiving Station.—A. F. Cameron (South Eastern Fever Hospital).—B.M.J. i./11,741. See also T. F. Ricketts, "The Diagnosis of Smallpox."

Small-pox and Chicken-pox—Differential Diagnosis.—L. i./12,569.

Glycerinated Calf Lymph is supplied in tubes each containing sufficient for 2, 3 or 8 cases, and also in vials for 30 to 40, and 60 to 80 vaccinations. **Vaccination Lancets** of special form are convenient.

Vaccine Injectors of Rubber are prepared of different forms and **Vaccination Shields** are *sine qua non* in careful vaccination.

N.B.—Vaccine Lymph is destroyed in potency in 36 *hours at* 37° *C.* (!), *and a temperature of* 57° *C. destroys it in* 5 *minutes. Ice chests are arranged for the Govt. Lymph to maintain at* 10° *C. Even a temperature of* −180° *for a long period* (11) *weeks maintains lymph active. Kept* 1 *year at* −5° *C. was found more active than that kept at* +10° *C. same time.—A. Newsholme, M.O., L.G.B.*

Chloroform water has been recommended to replace Glycerin to kill off extraneous bacteria, more rapid effect. Urgent demands for vaccine as in an epidemic, could be met by this method with a supply of vaccine in 14 days, instead of the month or 6 weeks necessary for glycerination.

For the storage and use of lymph it is recommended to mix lymph 50 parts, glycerin 25 parts, and water 25 parts.—Pr. lx. 284.

A treatise, historical, bacteriological, giving the method of manufacture of calf vaccine, the glycerination of the same, the filling into tubes, and the bacteriological examination of lymph.—W. H. M., C.D. ii./01,629.

The parasite of small-pox and vaccinia, an amœboid protozoon, can be stained with Safranin and Lœffler's Blue.—B.M.J. ii./04,1410 ; L. ii./04,1777

The organisms of variola, vaccinia and varicella.—L. i./05,118.

The virus of small pox and vaccinia. Description of theories of the contagium.—B.M.J. ii./06,1576.

Motile 'grains' in vast numbers are seen both in fresh variolous matter, and in the contents of a human vaccine vesicle They are considered as spores by de Korté; they are immobile in glycerinated lymph.

Attempted culture of the specific organism of vaccinia, amongst other methods, within a celloidin capsule in the peritoneal cavity of the rabbit.—B.M.J. ii./06,1780.

Cowpox, outbreak of.—L. ii./08,719.

Gout, rheumatism and allied affections have occasionally been found to improve on an inoculation with Calf Vaccine.

Small-pox epidemic in London resulting in a number of deaths. Tracing inception of the outbreak. Systematic visitation of all contacts. The infection appears to have started in a mild form, and increased in infectivity as it passed repeatedly through different hosts.—L i./11,687.

In the unvaccinated it is persons at the extremes of life, mainly children under 10 and old people who suffer most. In the previously vaccinated there were no cases at all in children under three and no deaths under 20, but as age advances the protective power diminishes.—A study at Liverpool, W Hanna, L. i./13,1253.

Small-pox in the Far East, South and Central America and in Europe Résumé.—L. ii./12,1813.

A concise account of Vaccination as first discovered and practised by Edward Jenner.—See a Lecture by R. T. Hewlett, P.J. i./13,398.

Variola Organism, Cultivation of, Experiments in India.—L. ii./12,20.

Leicester, a town with 230,000 inhabitants, has practically dispensed with infantile vaccination for 30 years. In spite of all the positive predictions to the contrary has dealt as successfully with small-pox as any other large industrial centre. An answer to 'Neglect of Vaccination.'—B.M.J. i./13,416.

Owing to laxity with which vaccination is now enforced an epidemic may break out at any time in the near future. Description of cases abroad. Revaccinated cases mild.—G. H. Mead, L. ii./18,206.

Half century of Small Pox and vaccination.—J. C. McVail, B.M.J. i./19, 297,339,373,408.

Whooping Cough, Vaccine of Whooping Cough Bacillus (Bordet-Gengou). For details of the Bacillus, *v. Vol. II.*

Is of service in lessening the violence of the paroxysms and shortening the duration of the attack. *Initial dose* for infants, 25 millions, children under 3 years 50 millions, over 3 years 100 millions. These doses are to be repeated or increased every 4 or 5 days. Ampoules contain 25, 50, 100, 250 and 500 millions.

As *B. Influenzæ* and the Pneumococcus commonly accompany Bordet's bacillus in these attacks the combination of half the dose indicated above of the *B. Influenzæ* and of ¼ the dose indicated above of the Pneumococcus is likely to prove beneficial. A Vaccine of this composition is supplied under the name **Compound Whooping Cough Vaccine.**

Vaccine used with advantage. Dose from 2½ to 20 millions.—B.M.J. ii./09,323,1062.—This dose is thought insufficient, *vide* above.

SENSITISED VACCINES (SERO-VACCINES).

Besredka's Sensitised or sero-vaccines are vaccines which have been treated with the corresponding antisera prior to their use. They possess certain advantages over the older form of vaccine.

(1) They are incapable of causing any ill-effects and the risk of overdose is negligible; (2) they produce no local or general reaction; (3) they bring about a more speedy rise to immunity without any precedent depression. Their use therefore is especially indicated; (1) in acute infections, especially if these be systemic in nature; (2) in severely toxic conditions; (3) for immunising purposes in the presence of an epidemic, *e.g.*, of plague, cholera, typhoid fever, cerebro-spinal fever, pneumonia, influenza or scarlet fever in order to secure rapid immunity in the as yet uninfected.

Their use is, however, accompanied by certain disadvantages:—The rise in immunity though more speedy in onset does not attain a correspondingly high level; hence they are not so well adapted for the treatment of chronic infections; they can only be prepared when the corresponding anti-serum is obtainable; great care is necessary in their preparation to exclude all other pathogenic bacteria, for whereas a bacterium is rendered innocuous by sensitisation with the corresponding anti-serum, this latter is without action on the contamination; thus unless sterility is afterwards ensured by heat, a procedure which may not be without ill-effect upon the sensitised bacilli, the use of such a contaminated vaccine is clearly dangerous; the keeping powers of sensitised vaccines are relatively smaller; de-sensitisation is said to occur in some instances after six months.

Dose.—"Sensitised Vaccines" are used in larger doses and at shorter intervals than other vaccines. The chief signs of immunising response are: improvement in the general well-being of the patient and at the infected focus if localised; in the temperature and pulse-rate. If the intitial dose result favourably in any of these directions especially with regard to the general well-being, that dose is repeated at the first signs of retrogression; if the resultant improvement be slight or retrogression speedy the next dose is of double or even quadruple strength; if no improvement result double or quadruple the initial dose is given the succeeding day. In the majority of systemic infections such as those due to the *streptococcus*, *staphylococcus*, *pneumococcus* or *B. coli* it is well to give doses of 100, 500, and 1,000 millions on successive days.

Caution.—The appearance of any local or general reaction must be taken as indicative that either the vaccine has been incompletely sensitised or that it has become partly or wholly de-sensitised since its preparation, hence either a fresh sensitised vaccine must be employed or that much care must be exercised in the rate of increase of dose. For immunising in an epidemic, *e.g.*, of Typhoid, doses of 1,000 ,2,000 and 5,000 millions are to be given on successive days.

Sensitised or Sero Vaccines of the following are prepared in strengths 100, 250, 500, 1,000, and 2,000 million per ampoule.

B. Coli
Diplococcus Meningitidis (Cerebro-spinal fever).
Gonococcus
B. Influenzæ
Pneumococcus
Staphylococcus (Albus or Aureus or mixed).
Streptococcus
B. Typhosus

For their manufacture in certain instances a supply of human antisera derived from patients who have been highly immunised against the corresponding bacterium have been used, in others antisera derived from calves or horses have had to be employed for the sensitisation of the bacteria.

W. B. Alcock first used living bacteria as Vaccines, on Besredka's principle, in the treatment of human disease. Micro-organisms, after contact with the specific immune serum containing the numerous antibodies, such as agglutinins, anti-aggressins, and antitoxins, in the serum of persons or animals infected with the particular bacterium, lose some of their virulence and become more readily phagocytosed and less toxic, but this loss of toxicity and virulence does not impair their vaccinating power. Cocci can be injected into the infected animal, first dead and then, after sensitisation, in a living condition, even into the veins, without harm resulting—the antagonistic properties being called into play and thus neutralising the lethal effect of the living microbes. In mixed coccal infections the phagocytes tend to take up and destroy the non-virulent strain while the virulent cocci are left untouched. He has given over 2,000 injections.

Method of Sensitising Cocci.

A Peptone Agar Culture or Serum Agar Culture is washed in 0·8% Saline and the Cocci then brought into contact with the Specific Serum for 1 to 12 hours according to the strain. Then centrifugalise, wash and prepare a new suspension in which 2,000 million bacteria are contained in 1 Cc. Children received 1/10 to ½ Cc. and adults ½ to 3 Cc. At first sensitised heated cocci were given, later sensitised living cocci. *Dose* repeated after 7 to 10 days. —Int. Congress of Med., 1913, B.M.J. i./13,385.

Vaccination with living micro-organisms in gonorrhœa and against various strains of *Staphylococci* and *Streptococci.* Results from 150 cases—the first experiments undertaken in the application of living sensitised Vaccines to man. It was found that an animal would support more Sensitised than Non-Sensitised virulent *Staphylococci* and *Streptococci.* A non-sensitised Staphylococcus Pyogenes Vaccine tried on the writer of the paper produced an abscess and lymphangitis necessitating cessation of work. The same dose sensitised was tolerated by a patient. Orchitis and epididymitis were well treated, as also rheumatism (gonorrhœal), tendinitis, periarthritis and arthritis with exudation. Large doses were found to be the best. Sterilised *gonococci* rapidly produce or stimulate a body reaction. In the **Staphylococcic Series** certain cases derived no benefit from dead Vaccines and were rapidly ameliorated by the living sensitised organisms. All cases treated by latter method were remarkably ameliorated. In the **Strepto-**

coccal Series—10 patients injected with living and 5 with dead Sensitised Streptococci. Results in general with the dead organisms good, but these were surpassed by the living organisms.

Dose.—Initially 20 million Staphylococci or Streptococci or 200 million gonococci (dead) and augment according to reaction.—W. Broughton-Alcock.—L. i./13,1155.

The method of preparing sero-vaccines is based on the observation of Ehrlich and Morgenroth, that when a specific antibody is brought in contact with the corresponding protoplasmic substance, the latter fixes the specific antibody to itself to the exclusion of every other substance. If, therefore, a bacterium and its antibody are brought into contact, the two enter into a firm combination, and this may be freed from all other substances which may be present; it thus follows that if an emulsion of bacteria and the corresponding antiserum are mixed together and allowed to enter into union, the bacteria and immune bodies bound thereto may be thrown down by centrifugalisation and be separated from the serum and contained substances, which, as stated, interfere with the powers of the bacteria to incite immunity; this combination of vaccine and antibodies is known as a "sensitised" or "sero-vaccine." —R. W. Allen, Jl. Vacc. Therap.

Prophylactic use of Sensitised Vaccines.—S. T. Champtaloup, B.M.J. i./14. 1221,1256.

References.

The combined use of Antiserum and Vaccine was tried by Lorenz in 1892—he endeavoured to protect pigs against swine erysipelas. Calmette and Salimbeni tried the method in plague. They found the resultant immunity was more prolonged than that given by Antiserum alone, but considerably shorter than that given by Vaccine alone, but it was found by Pfeiffer and Friedberger that the use of Serum seems to interfere with the production of active immunity due to the Vaccine. There is, when the two are given together, a rapid elaboration of toxic bodies due to their interaction and this may be detrimental to the production of immune substances by the tissues. The various antibodies cannot be elaborated to the best advantage because the tissues are overloaded with a sudden dose of toxin set free by the action of the antiserum on the Vaccine.

Vaccination for typhoid by living sensitised typhoid bacilli.—Experiments of Metchnikoff and Besredka proved that the chimpanzee could be protected against an infection following large doses of B. typhosi given by the mouth, while control animals contracted a disease which clinically appeared identical with typhoid in man. The method was to inject in two doses at 10 days' intervals an emulsion of sensitised living B. Typhosus. Experiments were conducted on man as follows:—

To a culture of 24 hours on gelose medium without Peptone 1 Cc. of sterile 0·8% Saline is added. The Emulsion is filtered through fine silk and ½ Cc. of Antityphoid Horse Serum is added. The mixture is left 24 hours at laboratory temperature (20° C.). Sufficient Saline is added and the mixture centrifugalised 5 to 6 minutes. After removing supernatant fluid more Saline is added and again centrifugalised, more fresh Saline is added to the washed bacilli and the strength finally adjusted so that 1 Cc. contains about 500 millions—the minimum adult dose. Results encouraging. There were no ill-effects whatever, no living bacilli were excreted in the urine or fæces, and the amount of local and general reaction was decidedly less than that produced by a corresponding dose of an unsensitised dead Vaccine.—W. Broughton-Alcock, L. ii./12,505.

Though anthrapoid apes cannot be immunised against typhoid by an infecting dose of dead bacilli, sensitised *living* bacteria had that power and these workers showed the method to be harmless.—Leader, L. ii./13,27.

Sensitised Typhoid Vaccine (1,000 million per Cc.), dose 1 Cc. upwards. adequate. Intervals of about 7 days between doses. Patient should rest 24 hours after a high dose.—W. Broughton-Alcock; L. ii./13,104.

By the simple process of bringing the Vaccine into contact with homologous immune serum the bacterial cells attract to themselves their specific antibodies present in the serum and become coated therewith. After sufficient time has elapsed for the absorption of antibody to take place the bacterial cells are centrifuged out, the supernatant serum is removed and replaced by saline, the deposited bacteria being freed from all traces of serum by centrifugalising provide a deposit which consists entirely of bacterial cells coated with their specific antibodies. The use of sensitised vaccine causes no diminution in the animal's specific resistance. In 19 cases of *Streptococcus pyogenes aureus* infection there was no harmful effect. In 12 cases—at least 6 of which were extremely grave—there was improvement. Prophylactically should be of great value.—M. H. Gordon, L. i./13,1796. See also a critical review by this author, Q. Jl. Med., 1912, p. 509.

Good results with Sensitised **Gonococcus Vaccine** in gonorrhœa and its complications—in acute and chronic gonorrhœal rheumatism and arthritic affections attributable to a previous gonorrhœal infection. Living Sensitised Vaccines best.—L. Cruveilhier, L. ii./13,1311.

Besredka's Vaccine appeared to have no advantages—Antityphoid Committee Report, but there was evidence that vaccine quite freshly prepared gave rise to local and constitutional symptoms more marked than customary.—L. i./13,1477.

The lack of capacity for harm of living sensitised bacilli has been proved by numerous observations. While endeavouring to produce a sensitised vaccine of a Streptococcus from a grave pulmonary infection, experimenter was severely cut through breaking a centrifuge tube. Many millions of the bacteria must have been introduced into the tissues, and many must have entered the blood-stream; as judged by the agglutination sensitisation did not appear to be very complete, but the preparation of the sero-vaccine was hurried on, and an hour or two later he gave himself 100 millions of the Vaccine with result that only slight feverishness occurred on the following day.—R. W. Allen, Jl. Vacc. Therap., July, 1913.

Gonococcal arthritis treated by sensitised Gono. vaccine. With this there is practically no pain or local reaction. Dose range from 25 million on the first day to 550 on the 30th day.—H. D. Haworth, B.M.J. i./18,4.

Gibson's Sensitised Dysentery Vaccine.

It has been thought possible to protect against infection due to the two well recognised causes of bacillary dysentery—the dysentery bacilli of Shiga and Flexner. Ordinary methods hitherto used to diminish reaction caused by vaccines of these organisms have not been found sufficiently reliable. Suggestion was made by Prof. H. R. Dean to use Eusol to neutralise toxins but Vaccines made in this manner become toxic on keeping. Sensitised Vaccines and the method of giving the Vaccine in conjunction with Antidysenteric serum also were disappointing because of defective power to stimulate the elaboration of protective substances. The late Captain H. Graeme Gibson conceived that this drawback was due to the bacteria being rendered inert as antigen by the antibacterial substances of the sera employed. To overcome the difficulty he absorbed these substances from the serum and after satisfying himself that the removal of the antibacterial substances from the serum did not interfere with its antitoxic action he gave the vaccine with this absorbed serum. Vaccines so treated led to very little reaction in man and laboratory tests showed that protective substances were formed in the blood. Protective inoculation against dysentery bacilli therefore rendered practicable.—Jl. R.A.M.C., June 1917, L.ii./17,127.

Detoxicated Vaccines. Prepared by removing the toxins from the organisms without thereby altering their specific antigenic properties.

An organism injected alive or dead is a specific antigen stimulating the production of antibodies towards itself—the more antigen the more antibody formed but the organisms are so toxic that only very small amounts of their dead bodies (as vaccines) could be injected and therefore the amount of antibodies produced by these preventive inoculations is limited by their toxicity. *Detoxication* (removal of poison), however, *has enabled the injection of* 10 *to* 100 *times the doses previously used.*

The cause of autolysis of the gonococcus is alkalinity. In an acid medium autolysis is prevented almost indefinitely. The organism is, that is, soluble in weak alkali but entirely insoluble in weak acids. In consequence the detoxicated vaccine is made up in a solution of 0·5% Di-Hydrogen Sodium Phosphate (Acid Sodium Phosphate), and 0·5% Phenol.

The *B. Influenzæ* (Pfeiffer) is especially soluble in weak alkali as also to a less degree the *meningococcus, B. Typhosus* and *B. Friedlander.*

The gram-positive organisms tested on the other hand, namely *staphylococcus, pneumococcus, streptococcus,* Diphtheroids, are comparatively insoluble. This relative insolubility is, however, not the invariable rule with gram-positive organisms.

Further work showed that organisms consist roundly of stroma (the bulk of the bacterium) and toxin. Both are soluble in alkali but the *stroma is thrown out by addition of acid* ($N/_1$ HCl) leaving the toxin in solution. The toxin can be removed by washing the precipitate with a weak acid, *e.g.*, 0·5% Acid Sodium Phosphate containing Phenol.

The specific antigenic characters of the gonococcus germ substance are not altered by being dissolved even in $N/_1$ NaOH.

It was found that both stroma (precipitate) and toxin are antigenic—the former the more so. Captain Thomson then came to the conclusion that no advantage therapeutically could be gained by the injection of powerful poisons like the endotoxins of this and other organisms when no antisubstance formation can be induced towards them. On the other hand antibodies such as agglutinins, bacteriolysins, precipitins and complement-deviating substances are produced against the *bodies* of germs by inoculation of the latter dead or alive as in vaccination.

The success of Typhoid inoculation according to the investigator is thought to be due to the relatively large bulk of this relatively large organism. (1250 million is an appreciable quantity to the naked eye).

In short, the toxin must be removed—the dead germs minus toxin will not have lost their specific power in the process—the endotoxins have little antigenic power when injected into tissues.

A detoxicated vaccine can be safely injected into the subcutaneous tissues away from the seat of infection without increasing toxic symptoms and compel healthy tissues to manufacture specific antisubstances while a toxic vaccine on the contrary cannot be safely injected in large quantities into a patient already suffering severely from the poisonous effects of the live organism.

Experiments (complement deviation) were conducted which proved that large amounts of antisubstances are produced by the injection of Detoxicated Vaccines.

It was found that a dose of 200 million of ordinary gonococcus vaccine produced malaise and fever in the normal subject while symptoms from 5,000 million in a Detoxicated Vaccine were scarcely noticeable.

Captain Thomson then describes his work on nasal and bronchial catarrhs to which he was subject. He inoculated himself with large quantities of his ordinary *Micrococcus Catarrhalis* and pneumo-vaccine but a *compound* Detoxicated Vaccine containing a mixture of pneumococci, M. Catarrhalis, B. Friedländer, B. Septus, streptococci, and B. Influenzæ 10,000 million per Cc. with first dose 1,500 million, second dose double and third dose also 3,000 million was far more effectual and gave no inconvenience.

Large doses are essential. 1000 million germs and upward must be given. In the case of *M. Catarrhalis, e.g.*, the small doses usually given are not enough to give any very definite immunity. Ordinary mixed catarrhal vaccines are so toxic that it is dangerous to give doses greater than a total of 200 millions.

Finally, Detoxicated Vaccines can be made up either neutral or slightly alkaline or with a weak acid (0·5% Acid Sodium Phosphate with 0·5% Phenol). In the latter case *the precipitate* has to be shaken up. This is found preferable—the inoculation is made subcutaneously Cases of gonorrhœa treated by this method have done well.—D. Thomson, L. i./19,374,1102.

The problem of removing toxicity has been attacked in various ways—*e.g.*, by Besredka's Sensitisation. Editorial praise and criticism of the new work. The reliance on the complement-deviation test it is thought is the weak rather than the strong point in a remarkable chain of evidence.—*Ibid* p. 1123.

✱**Phylacogens** (T.M. 343296, 346739) are filtered, sterilised, (72 hours) cultures of pathogenic micro-organisms and are preserved with Phenol 0·5%. The name Phylacogen is derived from Phylaxin, *i.e.*, a defensive protein found in animals that have acquired an artificial immunity to a given infectious disease. The principle is based on the theory of multiple infection. The cultures in question include those of **Pneumonia, Rheumatism, Gonorrhœa, Erysipelas,** and '**Mixed Infection**.' The latter has been advised 'in the treatment of all infections, acute or chronic, in which the condition is not due to a specific micro-organism—notably in surgical infections, abscesses, puerperal sepsis, eczema, fistulæ, etc.' The other Phylacogens are made from this as the basis by adding a filtrate of the specific culture required. Nephritis is a contraindication to their use subcutaneously. Intravenous injection is contraindicated in nephritis, in arteriosclerosis, and in cases with severe and dangerous cardiac involvement. The initial dose should always be given subcutaneously. Phylacogens are supplied in 10 Cc. vials for hypodermic or intravenous use.—Ther. Gaz., Apl., 1911.

Gonorrhœa Phylacogen.—After the injection there is a feeling of chill followed by a rise in temperature. Most patients suffer from headache after intravenous injection. Sixteen cases. The Phylacogen relieves pain, especially in gonococcal arthritis, but otherwise it does not appear to have any particular therapeutic value in gonococcal infection. The report is not very favourable. Intramuscular injections, though not advised by the makers, found to be more bearable than subcutaneous. The reaction is often distinctly unpleasant.—Major L. W. Harrison, L. ii./13,1375.

Pustulant eczema.—Mixed Phylacogen in doses from 0·5 to 8 Cc. successful.—L. i./13,1764.

Trenchant criticism of Phylacogens by H. D. Rolleston.—L. i./14,378.

ANIMAL ORGANOTHERAPY.

ANIMAL GLANDS AND TISSUES AND THEIR PREPARATIONS.

Preparations of various animal organs, *e.g.*, those of the brain, supra-renal capsule, the thyroid gland, bone marrow, duodenal membrane, pituitary gland and thymus gland, have been considerably employed as therapeutic agents during the last few years. The prefix ‘Opo’ meaning **juice**—is sometimes added to the names of the animal extracts.

Animal Membranes in the treatment of granulating wounds:—

The employment of Goldbeater's Skin, the peritoneum of the ox (known as *Cargile Membrane* in America) has been followed by that of the gastro-intestinal mesenteric attachments of the sand-shark, *Carcharias littoralis*, one of which produces 2 or 3 square feet of gossamer-texture strong material which can be kept in alcohol.—L. ii./04,2738.

Red Bone Marrow Extract.

The marrow of ox and veal-bones and sheep's ribs has been used as a remedy for pernicious anæmia, chlorosis, scurvy, purpura, hæmophilia, debility, lymphadenoma and rickets.

Tablets, containing 1 grain of the desiccated marrow, equal to 20 grains of the substance in its natural state. Each weighs 3 grains. *Dose.*—1 to 3.

✱**Marrubin** (T.M. 261511).—*Syn.* GLYCERIN EXTRACT OF RED BONE MARROW, **Medullary Glyceride.**

Dose.—1 to 2 drachms, increased if desired.

A thick brown liquid, made by extraction of the ox-bone marrow. Recommended as a substitute for cod-liver oil.

It is flavoured and readily assimilated. It has had beneficial effects on weak children, and is suitable for the treatment of anæmic conditions.

The following are made with *dose* 1 to 2 drachms—

Marrubin cum Pepsina. 1 grain Pepsin (*Off.*) in each drachm.

Marrubin cum Pepsina et Quinina. Nutritive, tonic and digestive.

Marrubin cum Bismutho et Pepsina. Nutritive and digestive.

Marrubin cum Bismutho et Ferrum. Nutrient and digestive.

Ⓟ**Marrubin cum Bismutho et Strychnina,** containing $\frac{1}{120}$ to $\frac{1}{60}$ grain Strychnine in 1 to 2 drachms respectively. Tonic.

Also combined with **Cascara, Tinctura Laxativa, Podophyllino, Hypophosphites,** and with **Ferric Phosphate.**

P1 **Marrubin cum Arsenio.** Containing in each drachm $\frac{1}{100}$ grain Arsenious Acid. In pernicious anæmia useful.—Tirard. Med. Treatm.

✱**Virol.** (T.M. 251002). A preparation of bone marrow, with malt, egg, and lime. Has nutrient properties for infants.

✱**Myelocene.** (T.M. 248326). Is an ethereal extract of bone marrow, with a small quantity (1%) of Chloretone; it has been used by inunction, and poured into the ear for deafness due to disease of the middle ear. Half a drachm of equal parts of warm alcohol 90% and glycerin may first be employed with massage.

Also used (previously liquefied by warming, after drying the surface skin) in eczema and psoriasis, and in rheumatism.

For lupus, the nodules are treated with Myelocene to remove the catarrhal processes, and then a caustic is used and the Myelocene treatment again esumed. **Myelocene Fluid** may be dropped into the ear.

Brain Extract Glycerinated. One minim equals three grains of sheep's brains.

Dose.—5 to 10 minims *per os*, or hypodermically.

Fresh Brain Extract. *Dose.*—2 to 4 drachms thrice daily.

Uses.—In various forms of insanity with every indication of advantage.—W. Maule Smith. B.M.J. ii./12,1451.

Thromboplastin. Made by chopping up and extracting fresh ox brains with equal amount of normal saline—left in refrigerator 48 hours, pressing through cheese cloth and adding to the extract thus made after diluting with ½ its quantity of salt solution 0·3% Trikresol. Effectual hæmostatic. Much used in cases of haemophilia in the States, *e.g.*, following removal of tonsils. It maintains its hæmostatic potency for many months.—A. F. Hess, L. ii./15,780.

Spinal Cord Extract.

Dose.—5 to 20 minims thrice daily by the mouth or hypodermically. 1 minim is equivalent to 1 grain of fresh spinal cord.

Spinal Cord Tablets, 2½ grains.

Brain and Spinal Cord Extracts.

These, separately or mixed together, may be tried for the relief of locomotor ataxy, chorea, epilepsy, and melancholia. **Cerebral tablets,** 5 grains. **Myelin tablets** contain 3 grains.

Corpus luteum—The yellow material separated from the inert substances of the ovaries, and desiccated. 1=5 of fresh substance.

Dose.—5 to 10 grains in capsules or tablets three times a day. In disordered uterine and ovarian functions, for menstrual irregularity, whether from excess, deficiency or pain; for the vomiting of pregnancy, and for nerve disturbances arising from change of life and consequent upon the removal of the ovaries. There is close complementary relation between the thyroid and the ovaries. Administration of Corpus Luteum and thyroid gland is of value in correcting the various forms of neuroses connected with ovarian atrophy. Has also been tried in anæmia, chlorosis, and Graves' disease.

Tablets are prepared equivalent to 1 grain of Desiccated Corpus Luteum=5 grains of fresh substance.

Crotalin. *Syn.* **Cobra Venom.**

Dose.—Hypodermically 1/200 gradually increased to 1/25 grain (0·0003 to 0·0026 Gm.)

In epilepsy 1/200 grain and then 3 to 5 similar injections at 8 day intervals, then two of 1/75 grain with 14 day intervals,—these generally suffice, if not one or more 1/50 grain dose at monthly intervals, then if symptoms not disappeared give 1/25 grain dose if necessary. Modify according to age and nature of the case.

Prepared from the venom of *Crotalus horridus* (rattle snake). The venom of the living reptile is desiccated by drying under a bell jar in the sun. Ampoules are prepared containing a glycerin and water solution with tricresol added as preservative.

Self in the "Medical World," in 1908, made the observation that people bitten by snakes remain proof against attacks of epilepsy for years.

R. H. Spangler, of Chicago, claims that epilepsy can be cured by the injections. He observed that an elipeptic in Texas was cured by a bite from a rattlesnake. Crotalin appears to act on the central nervous system, the condition of the blood and metabolism of the affected persons. The period of coagulation of the blood is lengthened. Spangler claims to have succeeded, with the venom treatment, in increasing the time of coagulation in eighteen patients from about two and a half minutes to about six minutes, the normal period being about seven minutes. A case is reported of a girl 11 years of age who took the treatment for seven months. The first week she had three attacks in a period of twenty-four hours, but only three minor attacks during the rest of the term of treatment, when she was declared perfectly well. In lung affections, phthisis, asthma, has also been tried subcutaneously, seldom given internally. See also Calmette and Mezie. Compt. Rend., 1914, 158,846; P.J. i./14,609.

Duodenal Membrane Liquid Extract. *Syn.* SECRETIN EXTRACT (glycerinated). Strength, 1 minim = 1 grain of the fresh mucous membrane of the pig. *Dose.*—5 to 20 minims. **Tablets** represent 5 grains.

In diabetes, by stimulating the secretion of the pancreas—with resulting increase in the oxidation process going on in the body.

Elixir Duodenalis. *Dose.*—½ ounce once or twice daily after a meal.

Duodenal Membrane Desiccated. Clean the upper portion of the duodenum of the pig. Scrape off the mucous membrane and scale on glass by drying between 70 and 80° C. Mix three of this with 1 of Calcium Phosphate and pass through No. 60 sieve. The temperature does not destroy activity of the "Secretin." P.J. i./06,166; C.D. i./06,255.

For Secretin and other **Hormones** *see Vol. II.* (*Organotherapy*)

✱**Secretogen Elixir.** (T.M. 365397.) *Dose.*—1 to 2 drachms (**4 to 8 Cc.**).

A proprietary preparation of Secretin intended to replace Pepsin and Acid mixtures as indigestion remedy. It is stated to contain pyloric prosecretin (with 1/20% of Hydrochloric Acid to change it to secretin) and duodenal secretin. Secretogen Tablets (5 grains) contain the duodenal and pancreatic secretins.—*See* also P.J. ii./12,799.

The Tablets are suggested particularly in faulty digestion of starch, with fermentation and flatulence.—L. i./13,44.

Eye.—A **Retinal Extract** has been tried in cases of atrophy of the retina and tobacco amaurosis.—B.M.J. ii./03,190. Is prepared of strength 1 ounce = 4 ox retinæ. *Dose.*—2 drachms.

In a case of rectrobulbar neuritis this preparation was remarkably successful. The eye which could not perceive an electric lamp a foot off can now see 6/9, and the result seems to be permanent. Improvement was marked one week after the treatment. Previous treatment for 2 months had been of no avail.—S. Percival, Newcastle-on-Tyne, March, 1915.

Hirudines (*Off.*). **Leeches.** *Hirudo Medicinalis and H. quinquestriatia*—the latter, the five striped Australian leech is now also (*Off.*). An active principle from, called Hirudin has been made by macerating the chopped-up heads in Normal Saline at 40° C.

(*To remove leeches lodged in the throat, e.g.*, from drinking water containing *Limnatis Nilotica.* Paint the leech with strong cocaine solution (15 or 20%) and remove with forceps or let it be coughed up, patient lying with head hanging. Menthol in Paroleine also suggested.—B.M.J. ii./08,525).

Hirudin. *Syn.*—**Leech Extract.**

Dose, intravenously, 0·02 to 0·3 Gm. in 50 Cc. Normal Saline. Solutions must be freshly prepared—*read below carefully.* Treatment of puerperal eclampsia by intravenous injection. Eclampsia thought to be due to effects of a super-saturation—flooding—of the blood stream with fibrin. Circulation is disturbed by formation of fibrin threads in the blood—thrombosis sets in with subsequent necrosis of the parenchymatous tissue—in particular that of the liver, preventing same from carrying out its purifying function, with result that poisonous metabolic products appear in the blood.

Hirudin has been suggested to be injected to abolish the placental fibrin. Diet poor in salt and in albumen is advised, simultaneously employing prophylactic measures to the utmost. Delivery to be as rapid as possible, also the removal of the placenta, then Hirudin injection (intravenously, useless subcutaneously). 0·02 Gm. in 50 Cc. Sterile Normal Saline has been given in a case of the severest eclampsia with success. Where circumstances permit Hirudin may be used as such *dry* with similar effect.—A. Dienst. Zentr. blatt f. Gynak., No. 50, 1909.

The above should be read in conjunction with the following from M., 1909 and 1910. The remedy may be dangerous in eclampsia, as to stop the coagulability of the blood means danger of post-partum hæmorrhage. The chief aim must be clearly delivery,—Hirudin treatment to be of secondary importance. In severe cases 0·2 to 0·3 Gm. is too low. The remedy is certainly potent as 1 Gm. will maintain the blood fluid for three to four hours, hence should be somewhat above 0·3 Gm.—this may be risked. If convulsions recur the injection may be repeated after three hours. The substance is not without toxic properties—0·1 Gm. given intravenously to a rabbit caused increased frequency of respiration, rise of temperature, apathy, somnolence and albuminuria.

Eclampsia effectually treated—all but 2 out of 14 cases, but further trials necessary before a final opinion can be given.—B.M.J.E. i./12,30, ii./12,1575.

For Experimental Purposes Hirudin has the property of maintaining blood in a fluid condition,—1 mgr. may be dissolved in 0·25 Cc. Normal Saline for the purpose,—this quantity will prevent 7·5 Cc. blood from coagulating without otherwise altering its composition.

Kidney Extract. In granular kidney the administration of Renal Extract has given striking instances of improvement. It must be freshly made. The kidney apparently has an internal secretion, and it is to the failure of this that the renal cachexia is due. The most remarkable case treated was one of long standing and apparently hopeless—chronic parenchymatous nephritis.—L. ii./09,1122.

Nephritis of malarial origin has been treated by kidney (from pig), pulped and macerated in normal saline.—L. i./09,62,68.

Liver.

Early cases of cirrhosis have been well treated with glycerinated liver extract. *Dose.*—20 Cc. daily.—B.M.J.E. ii./08,52.

Functions of liver and metabolism of fats. The liver is, *inter alia*, evidently the seat of the synthesis of fatty acids. Arachidic Acid has been found to the extent of 10% in pig's liver. This acid may be a product of the synthetic activity in question.—L. i./09,593

Desiccated Liver.—1 = 8 of fresh substance. *Dose.*—5 grains increased up to two or three drachms.

It increases diuresis, thus mitigating toxæmia by removing accumulated toxins. May be of service in mild cases of diabetes.—Pr., June '12,859.

✱**Paratoxine.** (T.M. 303320).—Described as a medicament extracted from liver, of value in early cases of tuberculosis of the lungs.

Employed by **subcutaneous injection** (average adult dose 1 to 3 Ampoules of 1 Cc. *pro die*), **pills and intratracheal injections**. It is stated to be harmless in action and non-cumulative. Slight rise in temperature may follow injection. The first course of injections should last 1 to 2 months The pills are taken two to four *pro die* if injections are proceeding simultaneously, otherwise intra-tracheal injections are given to reduce expectoration every two or three days.

Paratoxine B. is in ampoules for *internal use* only—in cases of 'bacillary diarrhœa.'

Lymphatic Glands, Tablets of, are prepared 5 grains each. *Dose.*—1 thrice daily.

Enlarged tonsils and adenoids well treated. The method consists in supplying lymphoid tissue artificially.

Snoring and noises in breathing disapproved and tonsils diminished in size. Thyroid enlargement in certain cases, *e.g.*, at puberty in girls submits to thyroid gland treatment. Adenoids and enlarged tonsils are thought to be an attempt on the part of nature to augment the lymphoid tissue of the body.—H. T. Ashby, B.M.J. i./13,1159.

In tuberculosis G. Perez believes good results are obtainable with a lymph extract.—Policlinico, 1912, xix., 481, per Pres.

Glandulen, from the bronchial glands of sheep in 4 grain tablets; has been tried in phthisis.

Mesenteric Glands of the Sheep, Desiccated.

Tablets, 5 grains (0·3 Gm.). In scleroderma satisfactory.—Münch. Med. Woch., Jan. 7, 1913.

Mucin. *Dose.*—5 to 10 grains (**0·3 to 0·6 Gm.**).

This is the essential constituent of the secretions of mucous membranes, buccal, nasal, pharyngeal, &c. It is precipitated from these by alcohol and by acetic acid. The saliva produced by the submaxillary and sublingual glands contains it, but not the parotid. It may be procured from areolar or connective tissue, and from bile.

Taken internally, *e.g.*, **Tablets,** containing Mucin 5 grains with Sodium Bicarbonate 5 grains, relieves painful digestion, gastritis and gastric ulcer. In the form of Nebula containing Mucin 5 grains, Sodium Bicarbonate 5 grains, Menthol 1 grain, Lime Water ½ ounce, Distilled Water ½ ounce, has been found of value in dry catarrhs, rhinitis, &c., pharyngitis, and where incrustations on the laryngeal lining.—L. ii./00,730; i./02,961; i./03,374.

***Elixoid** (T.M. 26237 and 251718) **Mucin.** *Dose.*—1 to 4 drachms before and after each meal. As much as 3 ounces a day were given and were found soothing and moistening to the tongue and throat. As an adjuvant to thyroidectomy in the treatment of cancer. (Mucin is deficient in the carcinomatous subject). Several cases cited showing improvement in malignant growth after thyroidectomy or partial removal of the thyroid glands.—L. ii./09,1138.

Mycolysine (Doyen's). A preparation of the extractives of natural ferments. **Mycolysine Liquid** an alcoholic (wine) preparation. *Dose, per os.*—1½ to 2 ounces 3 or 4 times a day; MYCOLYSINE EXTRACT (non-alcoholic) 2 to 3 drachms. Children in proportion in each case. **Mycolysine Injection** (subcutaneous) 10 to 40 Cc. repeated every 5 hours.

Induces phagocytosis resulting in the destruction of bacteria and toxins. In the preventive and curative treatment of diarrhœa, anæmia, cancer, tuberculosis, and a variety of infectious diseases.

Oleum Telesphoros.

An animal oil collected from the fat of the omentum. Has been used in abdominal surgery to prevent the formation of adhesions following operations and the treatment of adhesions if they have formed. It remains liquid at body temperature and is readily taken up by the mucous membranes.

Ovaries.

Following the example of Spermin obtained from the testes, some experiments have been made with the ovaries. An extract has failed in the treatment of osteomalacia but has proved of value in dysmenorrhœa and menorrhagia, and for climacteric ailments.

Tablets, 5 grains.

The name * '**Varium**' (T.M. 260858) is given to a trade brand of Ovarian Extract.

Chlorosis, mental disease and hæmophilia have been treated.

Hæmophilia treated by Ovarian Extract and vegetarian diet; striking result.—B.M.J. ii./08,1182.

***Ovamammoid** (T.M. 346373) **Compound (Lowenthal) Capsules** *Dose.*—1 thrice daily ½ hour before meals and one at bedtime.

Contain Ovarian Extract 1 grain, Mammary Gland Extract 1 grain, Lactose 3 grains.

Used in neurasthenia, hysteria, insomnia, chlorosis, amenorrhœa and dysmenorrhœa. Stated to be a galactagogue and emmenagogue.

Pineal Body. *Syn.*, Conarium. A small reddish grey vascular body situated behind the third ventricle which is embraced by its two peduncles.

The dissection of the head of a tuatara (*sphenodan punctatus*) led to the discovery of the origin of this body in vertebrates. The reptile in question has three eyes,—the third in the centre of the forehead only hidden by a thin membrance of skin, forms the fore end of the pineal gland. This central eye is not strictly a third eye in process of development, but the first and single eye in process of being *discarded* by gradual degeneration.—Sir A. P. Douglas, Vet. Record, *per* P.J. i./13,151.

The functions of the pineal gland are little known. Extracts of it when administered act as diuretic and galactogogue. There appears to be some antagonism between the pineal and pituitary bodies as removal of the testicles produces atrophy of the former and hypertrophy of the latter. The pineal body appears to have two distinct functions, the first being a restraining influence on sexual development which ceases at puberty, the other an unknown influence on general metabolism which continues through life.—L. J Kidd, Rev. Neurology and Psychiatry, Jan., 1913, per Pres. See also L. i./14, 401.

Administration of the gland would probably be of no value medicinally. Experimental extirpation does not affect health of living animals.—Jl. American Med. Ass., 1916, 67, 1836, per P.J. i./17,87.

Pituitary Gland. *Syn.* **Hypophysis Cerebri.**

A small reddish grey vascular body, a ductless gland, weighing about 10 grains, situate at the base of the brain. '*Anatomically*, the gland consists of three parts,—the anterior lobe, the *pars intermedia*, and the posterior lobe. The anterior lobe (**Hypophysis**) is the larger, and is made up of cubical or polygonal epithelial cells,—in structure it is rather like the fœtal thyroid. Disease of this portion is associated with acromegaly. The *pars intermedia* lies between the anterior and posterior lobes and is developed in connexion with the anterior lobe. The posterior lobe is connected with the floor of the third ventricle, from which it is developed by the neck or infundibulum=a funnel. In man both neck and body are solid with traces of a cavity in the neck.'

Physiologically.—In the earlier days the function of the gland was thought to be secretion of nasal mucus, hence the name (*pituita* = mucus or phlegm). Removal of the entire gland leads to depression, muscular weakness, dyspnœa, emaciation and death. Removal of the anterior lobe leads to genital infantilism. *Insufficiency* of the pituitary gland is associated with weakness, wasting, etc. *Excessive secretion* is followed by high arterial tension, polyuria, glycosuria and acromegaly.—L. ii./10,1828.

The internally secreting glands (thyroid, parathyroid, suprarenal. pituitary) have no other function so far as is known than of producing chemical substances of the nature of **Hormones** (*q.v.*, *Vol.II.*) —influencing other organs to which they are conveyed by the blood.

It is interesting to note they are all small in structure yet they are essential to the maintenance of life.—Sir E. Sharpey Schafer, B.M.J. ii./12,597.

The posterior part of the pituitary body (composed partly of nerve fibres and cells) exercises a powerful influence over the vasomotor nervous system and the regulation of blood pressure, especially in the brain ; while the anterior or glandular part influences the development of the form and size of the body and the growth of the bones. Acromegaly is associated with a specific hypersecretion of the anterior part of the organ.—Prof. Bert. Fischer.—B.M.J. ii./11,338.

The Hormones supplied by the posterior lobe including the *pars intermedia,* regulate the tone and contractability of plain muscular tissue generally and of the heart, and stimulate the activity of the mammary gland and of the kidney.—L. ii./13,202 ; see also G. A. Gibson, B.M.J. ii./12,163.

For further description of the parts of the gland see H. Cushing (review) B.M.J. ii./12,1409.

Results of partial and complete removal of the gland vary. Some found that the complete removal does not always lead to death,—others that it causes death rapidly. Handelsmann and Sir V. Horsley repeated investigations.—B.M.J. ii./11,1150.

Histology indicates that the *anterior* portion is the active part, the posterior being merely a *vestigial* structure, but *physiologically* the opposite is the case—an extract of the whole gland may be used therapeutically, but the posterior lobe is of greater importance and value, as described later. Pituitary Extracts promote excretion of Nitrogen, Calcium and Phosphorus, but further information is necessary, as dried extracts appear to operate differently to fresh preparations.

Opinion seems much divided as to **which portion of the pituitary gland contains the blood pressure raising principle**; Howell, Oliver, Vincent, and Schafer, favour the posterior lobe. Lewis, Miller, Matthews, and Biedl, claim for the *pars inter media.* Lewis, Miller, and Matthews, obtained a rise of pressure more frequently from injections of extracts of the anterior lobes than from those of the posterior, but Schafer and Herring thought that the activity of the anterior lobe might really be due to post-mortem infiltration. Hamburger found that the anterior lobe gave extracts which lowered blood pressure.

Schafer and Vincent found that the pressor body, at least in the form that it exists in the glands, was insoluble in Alcohol, while the depressor substance is soluble in Absolute Alcohol.

Aqueous extracts can be boiled—at least for a short time—and the coagulated protein removed with little or no loss of activity—as shown by the work of Sir E. Sharpey Schafer and G. Oliver, in 1895. *c.f.* Preparation of Pituitary Extract *infra.*

Hydrogen Peroxide destroys the pressor substance, but reducing agents,*e.g.*, Hydrochloric Acid and Zinc have no effect.—A. C. Crawford and Z. Ostenberg, Chemistry of Pituitary Pressor Compounds.—Am. Jl. Ph., July, 1914.

It appears that there are certain resemblances in the action of the Pituitary Extract to that of Suprarenal Extract, but they are certainly not identical since the vascular contraction and cardiac inhibition obtained with Pituitary Extract are much more prolonged than those with Suprarenal Extract. A striking difference is, however, seen in relation to their effects on the kidney, for while Suprarenal Extract produces a marked constriction of the renal vessels and cessation of the flow of urine, Pituitary Extract produces dilatation of the vessels of the kidney and an increase in urine;

It is also interesting to note that "the effect upon the kidney is not proportional to the amount given; indeed, within certain limits the kidneys seem to respond more readily to a small than to a large dose of the Extract, a fact which the writers suggest is in consonance with the view that the pituitary body produces a secretion which is discharged into the blood and subserves a diuretic function. The diuretic activity of this substance is far greater than that of any substance in the Pharmacopœia.—L i./07,304.

Pituitary Body. Blair Bell's Monograph reviewed.—B.M.J. ii./19,381.

Dried Pituitary Preparations.

Of these there are three, made respectively from the **Entire Glands**, the **Anterior Lobe** and the **Posterior Lobe**:—

(i.). **Pituitary Body, Dried (Entire Gland)** of the ox.

Dose.—1 to 3 grains (0·06 to 0·2 Gm.) thrice daily.

Five parts of fresh gland yield about 1 of dried gland.

Tablets of this entire dried pituitary gland contain 0·06 Gm. (1 grain).

Uses.—Has been employed to improve metabolism, to raise arterial tension, to increase diuretic action and to improve appetite. Given in menstrual disorders and in exophthalmic goitre.

(ii.). **Pituitary Substance Dried (Anterior Lobe *only*).**

Dose.—1 to 4 grains (0·05 to 0·25 Gm.). 4·5 parts of the fresh substance yield about 1 part of dried substance.

Uses.—Has been thought to exercise a stimulating action upon growth. Experiments on animals have indicated increased development of the reproductive organs (Cushing).

(iii.) **Pituitary Substance Dried (Posterior Lobe *only*).**

Dose.— 1 to 4 grains (0·05 to 0·25 Gm.). Made as above using the posterior lobe only. 4·5 parts of the fresh substance yield about 1 of dried substance.

Uses.—Has been used in exophthalmic goitre, acromegally and by its action on the circulatory system to relieve cardiac dilatation. For further details see Pituitary Extract—the liquid equivalent.

Liquid Pituitary Preparations:

Pituitary Extract Liquid of *Entire* Gland "*Special.*"

Dose.—½ to 1 Cc. intramuscularly into the buttock. **Sterules** ½ and 1 Cc. are prepared.

Strength 1=1 of fresh *entire* gland.

Use.—This has been tried in certain types of acromegaly attributable to disease of the pituitary. It is advised to start with ½ Cc. daily and watch the case.

Pituitary Extract. *Syn.* **Pituitary Liquid, Extractum Hypophysis Cerebri Liquidum, Liquor Hypophysis, U.S.** (*Infundibular—i.e.*, from the posterior lobe). *Dose.*—½ to 1 Cc. of 20% Extract representing 0·1 to 0·2 Gm. of Fresh Infundibulum, *intramuscularly* to secure prompt action and to avoid superficial sloughing from local vasoconstriction. May be repeated at 1 hour intervals.

A sterile solution containing the active principle of the posterior lobe of the gland of the ox in normal saline.

Sterules of Pituitary Extract—½ and 1 Cc. are prepared.

✱Infundin. (T.M. 349379), (**✱Pitibulin** (T.M. 384472), **Pituitarin, Pituitrin** and **Pituglandol** (B.M.J.E. i./13,42) are solutions of the Infundibular Extract.

Active Principles of the Gland. A specific active principle has not been isolated. One worker has isolated eight substances from the infundibular portion only 4 of which are active and these four collectively are called **Hypophysin.**—G. B. Roth, Bull. No. 100 Hyg. Lab. U.S. Public Health Service—see Abst. P.J., i./15,410.

A substance to which the name ✱Hypophysin (T.M. 321726) was given was claimed to be the active Hormone of the gland. Patented process of making by precipitating a Sulphuric Acid extractive of the glands with Phosphotungstic Acid and decomposing it again with bartya. The 1 in 1,000 solutions of the salts so obtained, termed Hypophysin, is stated to be eqivalent in activity to a similar solution of Pituitrin.—P.J. 1./13,514,563.—D.M.W 39, 491; Y.B.P., 1913,21. *See also* **Tethelin.**

Preparation of Pituitary Extract. Mince finely the posterior lobes of the fresh glands and extract with acidulated water. Heat the liquid to boiling for 10 minutes to remove coagulable protein and filter. Finally sterilise and keep in sealed ampoules.

In the manufacture of Liquid Pituitary preparations for Injection the important point to realise is that they will not tolerate heat either in alkaline or neutral condition.

Recognition.—Pituitary liquid gives the biuret reaction. Alkaloidal precipitants such as Phospho-molybdic Acid, Phospho-tungstic Acid, Bromine Water, etc., all give faint but distinct precipitates of the active principle.

Assay.—U.S. IX. assays by determining effect on the uterus of the guinea pig.

B-imino-azolyl-ethylamine Hydrochloride (*c.f.* p.399) suggested as standard. It produces contraction of the uterus in as high a dilution as 1 in 250,000,000. See Am. Jl. Ph., March, 1915, and P.J. i./15,410.

Report on Physiological Examination :—

A well known Professor of Physiology in London has been kind enough to report (December, 1917) on a sample of **Pituitary Extract made in our laboratories** in June of the same year :—

(1) **Arterial Blood Pressure.** (Experiment on Cat).

The rise of blood pressure was very pronounced and lasted a considerable time. In his experience he had never seen a better rise with other preparations. One cannot compare subsequent injections of the same or other preparations by a second injection on the same animal, as a second injection produces only a fall of pressure, due to the presence of a depressor principle in the extract.

(2) **Kidney Volume.** (Experiment on Cat).

This was markedly increased. The result was as good if not better than obtained with other preparations. The effect was indeed visible to the naked eye without instrumental operation.

(3) **Flow of Urine.** Diuresis. (Experiment on Cat.).

The effect was most pronounced and occurred whether the vagi were cut or not.

(4) **Action on Uterus.**

A guinea pig, weight 530 Gm. was employed and Dale's Apparatus used with 250 Cc. of oxygenated Locke's Solution.

Results with 0·1 Cc. of following preparations in the 250 Cc. of solution = 1 in 2500.

a. A specimen made in the Professor's own Laboratory	Rise of recording lever	= 9·5 cm.
b. Commercial sample (another maker)	,, ,, ,, ,,	= 9·5 ,,
c. Martindale's	,, ,, ,, ,,	= 5·5 ,,
d. Another Commercial sample	,, ,, ,, ,,	= 4·5 ,,

Using a dilution of 1 in 250, maximal effects were obtained with a, b and c, but only half the maximum was obtained with d. This method of standardising Pituitary Extracts has been criticised and it is doubtful whether the so-called active principle is not a mixture of several—one acting on blood pressure, another on the kidney and so forth

(5) **Milk Flow.**

This was not tried being unable to obtain a lactating animal, but as the effect on the mammary gland is mainly if not entirely on plain muscle one may take it for granted, if (1) and (4) are positive (as was the case) that the effect on milk flow would be positive.

With regard to the **keeping quality**, the 1917 preparation was re-examined November, 1919—*i.e.*, 2½ years after it had been prepared. It had approximately half its efficiency on the guinea pig uterus. The effects on blood pressure, kidney, etc., were not tried.

This report prompted us to experiment still further in order to produce a preparation which would show a more favourable comparison in its action on the uterus, and in July, 1919, we adopted a ***new process of manufacture***, with the following result:—

The same authority in November, 1919, reported on a **further series** of experiments. The preparations examined and compared on this occasion were:—

a. Specimen made in the Professor's own laboratory.

b. Commercial sample purchased in the ordinary routine marked 'to be used before December, 1920.'

c. Martindale's prepared by the new process July, 1919.

He states this new preparation of ours was so extraordinarily active on the guinea pig uterus "that we were obliged to dilute down to 1 part in 240,000 to obtain measurable tracings. Anything stronger (1 in 120,000 and upwards) gave a maximum effect and carried the recording lever straight off the drum."

This preparation gave more than twice the effect of the 1917 preparation (reported on above and examined in 1917).

The 1919 preparation was about equal to (a.) in this new series and in one experiment rather *better*.

It was furthermore at least twice as powerful as (b.) in this series. Martindale's preparation produced the effect promptly while with (b.) the effect was produced only after a long delay and the final effect was only about half that obtained with Martindale's as stated.

Examination of commercial preparations by physiological methods showed same to vary enormously.—L. i./15,764.

Uses.—Pituitary Extract causes uterine contraction and has a special action on uterine muscle. It stimulates unstriped muscle especially affecting also the arteries, spleen and intestinal muscles. Should not be injected during the first stages of labour, because if the os uteri is not fully open the energetic contractions may cause a rupture of the uterus.—" New and Non-official Remedies," 1914. It keeps blood pressure raised for hours; but in no way supersedes or takes the place of Saline infusions. It is useful in shock and has control over post partum and other uterine hæmorrhage. It may improve appetite and capacity for sleep.

Contra-indications may be heart disease, arterioscleriosis and kidney disease. In arterial disease of the aged sudden increase of blood pressure by pituitrin might cause apoplexy.—L. i./15,289.

N.B.—The Extract produces arterial degeneration if administered too long—it is a remedy for emergency, not routine use.—L. ii./10,1828.

It is stated to quieten and strengthen heart beat and to increase flow of urine; acts similarly to Digitalis and Strophanthus.

When a second or subsequent dose is wanted the fresh dose will not produce more than a small fraction of its effect unless some time has elapsed.—B.M.J. ii./09,783,1609,1805. Pr. Nov. '09,742.

It is suggested that such preparations may, by action upon the circulatory system, be of value in endocarditis, cardiac dilatation, arteriosclerosis, cerebral anæmia and shock, may favour compensation and lessen tachycardia. Exophthalmic goitre has benefitted. Effect on the kidneys points to use in suppression of urine. May control hæmorrhage, *e.g.*, in typhoid fever. Its effect upon metabolism has led to its use in acromegaly and skin affections.

Adrenalin injected subsequently to Pituitary Extract increases arterial pressure apparently for longer than without a previous injection of it.—B.M.J. ii./08,789.

Daily dose should not exceed the equivalent of ½ a fresh gland of the ox. Arterial pressure to be observed and taken as guide to modify dose if necessary. Should not be given when pressure is high nor combined with Suprarenal Extract.—L. i./10,381; see also B.M.J. i./10,350.

Acromegaly is better treated by pituitary body extract than by thyroid. Some good appears to come from its use in fair proportion of cases.—Guthrie Rankin.—L. i./09,28.

F. Golla was the first to use Pituitary Extract. Subcutaneous injection of the Extract in a case of advanced Addison's disease produced marked rise of blood pressure and diuresis,—the latter lasting 24 hours. The activity of the preparation is not impaired by boiling. Action in producing contraction of the uterus is said to last longer than that of Ergot. It should not be used until after completion of the third stage of labour, excepting possibly in certain cases of placenta praevia. Results in 70 cases. Useful in treatment of hæmorrhage, intestinal paresis and shock.—L. ii./10,1828.

Addison's Disease: Two cases benefited.—O. Leyton, B.M.J. i./15,245.

Pituitary body and optic chiasma lesion with acromegaly benefited by Pituitary and Thyroid Extracts. Special Extract of the anterior pituitary lobe alone—used with some sign of benefit.—L. i./11,303.

The action of Pituitary Extract and Adrenalin on peripheral arteries. Employing the method of O. B. Meyer, adrenalin constricted the peripheral arteries with the exception of the intravisceral portion of the pulmonary, the coronary, and cerebral arteries. The coronary and cerebral vessels were dilated, and the intravisceral portion of the pulmonary was unaffected. Pituitrin produced dilation of the splenic, hepatic, and gastric arteries except along the first 3 or 4 mm. after their origin from the cœliac axis, in which part constriction was produced.—D. V. Cow, Na., March 16/11, p. 101, *see* also L. i./11,939.

In ***labour pains*** injections of Pituitrin have a strengthening effect.—M.P.C. i./12,45. Useful in full-time pregnancies as a means of inducing strong labour pains, especially where pains have already set in, but have become weak or ceased.—B.M.J.E. i./12,19. B.M.J.E. i./12,34; i./13,2,50; *see* also B.M.J. i./14,906,1046; B.M.J. ii./16,781—½ Cc. in the late first stage acts like a charm. A quick labour often occurs after it.

Avoids the necessity for use of instruments in midwifery practice. It is of very little use in cases of abortion having little effect in the early months. Later and especially during labour effects are striking. The injections appear to act best in the latter part of the second stage of labour.—L. ii./12,544. In childbirth subcutaneous injection found to be best.—B.M.J.E. i./13,75.

INFUNDIN injected in midwifery—0·5 Cc. deeply into the buttock after the *os* is well dilated. Labour is shortened and suffering of the patient lessened.—B.M.J. i./19,432.

The injection must not be given too early. Wait until the *os* is well dilated otherwise there is risk of danger to the child. Further there is risk of retained placenta by the uterus contracting over it. Remove as rapidly as possible by expression if necessary. It is important to see that clots as well as placenta are quickly removed. Give Liquid Extract of Ergot 1 drachm immediately after delivery of placenta and 2 grain Ergotin Pills at 4 hour intervals.—R. Rolfe, B.M.J. i./19,728.

Rickets, Pituitary Gland in—on the grounds that Pituitrin was found of value in osteomalacia and that the view is held by many that rickets and osteomalacia are manifestations of one and the same disease—the one in early the other in later life. The gland contains a considerable quantity of Phosphorus. Disturbances of Phosphorus metabolism are thought to contribute to rickets.—B.M.J.E. i./13,24.

Galactagogue action of Pituitary.

In an 'Experimental Investigation of the mechanism of milk secretion with special reference to the action of Animal Extracts' K. Mackenzie (Jl. of Exp.

Physiology, Dec., 1911) communicates interesting results.—Extracts from the pituitary body, corpus luteum, pineal body, lactating mammary gland and involuting uterus were found to possess *galactagogue action*—the pituitary gland being the most active. The galactagogue substance of the pituitary body is not destroyed by drying or boiling a weak Saline Extract. Intravenous action is rapid—the matter of a few seconds. Experiments were made on lactating cats—the amount used was 5 Cc. of the Extract = the active principle of 3 pituitary bodies of the ox. Pituitary secretion may be increased during lactation. Extracts of the pituitary body of the fowl are also actively galactagogue injected into cats. It is suggested as of commercial value to determine whether the amount of cow's milk would be similarly increased. Experiments showed that hormones inhibitory of mammary secretion are formed by the fœtus and placenta—see also Atropine and Pilocarpine.

Sir E. Schafer thinks it impossible to accept the view that pituitrin stimulates the secretory mechanism of the mammary gland.—B.M.J.ii./15,146.

Experiments on the depressor action of Pituitary Extracts indicated that when the blood becomes saturated with Pituitary Extract, an interaction takes place, which converts its constricting action on the peripheral vessels into a dilating one.—P.J. i./12,10.

Intestinal toxæmia.—Chronic constipation in, well treated with Pituitary Extract hypodermically and *per os*.—Glas. Med. Jl., Sept./13,177.

Paralytic distention of the intestines—possibly of value in.—New and Non-Off. Remedies, 1914.

Heart failure successfully treated. Immediate effect required which could not be obtained from digitalis, strophanthus, etc.—L. i./15,289.

Output of urine in polyuria reduced by the pituitary extract increasing the capacity of the kidneys to secrete a concentrated urine. Effect useful in diabetes but transient, lasting for a few days only.—B.M.J. ii./16,298.

Diabetes insipidus treated by 2 Cc. of Injection hypodermically.—B.M.J. ii./18,197.

In acute heart failure improvement but word of caution given as to its use in the aged.—L. i./15,289.

Tethelin.

Dose (suggested) 0·1 to 0·2 Gm. repeated at intervals of from 24 to 48 hours either locally or subcutaneously. The first dose may be applied locally as a dressing to wounds and simultaneously subcutaneously in an average case.

This body is stated to be the active, growth-controlling principle of the *anterior* lobe of the pituitary body. It is unstable and of obscure composition. It differs in its physiological effect from the extracts and active principles of the posterior lobe (infundibulum). It has no appreciable action on blood pressure or the flow of urine. It has a stimulating and regulating influence on growth not only normal but in those forms involved in the replacement of tissue lost through inanition or fevers and in the repair of wounds. In use it causes a marked leucocytosis (especially polymorphonuclears).

Solubility, about 1 in 20 in water. The solution may not be heated.

Contraindicated in malignant disease.—T. Brailsford Robertson, Jl. Biol. Chem. Vol. 24, 1916, p. 397 and 409; Jl. Am. Med. Assn., Vol. 66, 1916, p. 1009. *See* also B.M.J. ii./17,430.

Prostate Gland. An extract both of human and canine injected intravenously causes contraction of the bladder and lowers blood pressure.—Battey Sem. Med., Jan. 15/13, per Pres.

Spleen Substance Desiccated.

Dose—5 to 10 grains (**0·3 to 0·6 Gm.**) 1 part represents 5 of the fresh spleen. Has been used in anæmia, tuberculosis, myxœdema, etc. Valuable in typhoid and malaria—the effect being possibly due to splenic hormones.—L. i./13,524,853.

***Hormonal.** (T.M. 330346).—*Dose.*—15 to 20 Cc.—less for children.

Hormonal is said to be a sterile solution of a cell product (Hormone) which appears chiefly in the spleen and to which peristaltic action is due. *Two forms* are supplied—*for intramuscular injection* and *for* *intravenous use.* Castor Oil (1 ounce) is to be given simultaneously with the intramuscular injections. The intramuscular dose produces on injection in equal quantities into the right and left gluteal muscles an effective evacuation. For use in obstinate chronic constipation and acute intestinal paralysis. Effects are said to be lasting, and one injection is invariably sufficient.—L. ii./11,1143. During the intravenous use of the preparation we note Morphine is to be avoided. 20 Cc. Ampoules are prepared.

Given by the mouth in 20 Cc. doses it is claimed to be a physiological remedy for constipation. A report states that a single dose in a case of severe constipation produced effect and regulated the bowels for a long period.—American Medicine, Feb., 1913, per Pres., Apl., 1913.

Chronic constipation. Two cases known to have benefited by a single injection. Effect difficult to understand.—O. Leyton, B.M.J. i./15,246.

Kinazyme Tablets.—A preparation made from extract of spleen enterokinase and other enzymes and hormones of the duodenum, also pancreatic substance and trypsin, with ½ grain calcium lactate in each tablet. In malnutrition, anæmia, etc., especially in tuberculosis.

Suprarenal Gland.

An average sheep's gland weighs about 2 Gm. (30 grains).

Development, structure and functions of the glands.—L. i./05,178.

The fresh gland was first given to relieve Addison's disease, then dried preparations were used, also liquid extracts, and lastly an active principle, Adrenalin, which, in the form of its Chloride, is now used both internally and externally for many purposes.

These preparations cause contraction of small blood vessels when applied locally, blanching the skin or mucous membrane, and have a general tonic effect on the arteries when given internally, they strengthen the heart's action, slow and regulate the pulse. Locally there is an astringent action, and capillary bleeding, epistaxis and menorrhagia are checked; useful for bleeding after tooth extraction, and of the greatest value applied to the nostrils for hay fever and coryza. It is applied by the surgeon to check bleeding and blanch the parts for operations on the eye, ear, nose, throat and larynx.

Uses.—Internally the action resembles digitalis and acts as a cardiac stimulant in mitral regurgitation and in cases with a weak irregular pulse, and may be given in any form of hæmorrhage; but it is really only efficient when it can reach the actual bleeding surface—hence will stop hæmatemesis, but not hæmoptysis; it may also be given to relieve syncope from chloroform. Its use has been suggested in Graves' disease and Addison's disease.

Suprarenal Gland, Dry.

Dose.—½ to 3 grains, three times a day.

Tablets, Compressed, each equivalent to ½ and 1 grain of **Dry Gland Substance,** are prepared.

Suprarenalum Siccum. U.S. IX. *Average dose.*—4 grains. Suprarenal glands of animals which are used for food by man, freed from fat, cleaned, dried and powdered. Contains 0·4 to 0·6%

epinephrine and if assayed biologically 1 Gm. contains the equivalent of 10 mgr. lævo. methylamino-ethanol-catechol (adrenalin). Ash limit, 7%.

In practice we find an average sheep's gland weighing 30 grains yields 5 grains of dry powder.

Addison's disease—requires 20 to 30 grains thrice daily continued indefinitely.—O. Leyton, B.M.J. i./15,245.

Exophthalmic Goitre.—Suprarenal gland eulogised. Pulse rate reduced, protrusion of eyeballs disappears. The thyroid gland diminishes. Tremor and every other nervous symptom vanishes and patient is restored to health as stated by the late G. Gibson, —L. ii./12,216. Milk of thyroidectomised goats not successful. Merck's Serum and Tyroidectin quite inert.—Hector Mackenzie, L. ii./16,815.

In tuberculosis with relatively slight pulmonary symptoms. Suprarenal Gland in doses of 4½ to 9 grains daily has been used.—Pr., Jan., '13,378.

Neurasthenic cases well treated with 2 to 6 grains of Suprarenal Gland in Tablets for 4 to 7 days at a time.—W. J. B. Selkirk, B.M.J. i./14,816.

Suprarenal Snuff contains—

Dry Suprarenal Gland 1, Menthol 2, Ammonium Chloride 6, Boric Acid 4, Lycopodium 4, and is for use in hay fever. ✱**Rhinodyne** (T.M. 250061) contains this extract.

Tabellæ; Chocolate, contain ½ grain of dry substance equivalent to 4 grains of fresh gland, and are agreeable for internal use.

Nebula Extracti Suprarenalis, C.L.T.E.

Suprarenal Extract Gland 48 grains, Sodium Sulphate 10 grains, Distilled Water to 1 ounce.

Liquid Extract of Suprarenal Glands.

Dose.—10 to 15 minims (**0·6 to 0·9 Cc.**).

A light brown liquid prepared with glycerin, strength 1=1 of fresh gland. It was with this preparation that all the early valuable results were obtained. For local application rarely used stronger than 10%.

Suppositories contain 3 minims of Liquid Extract in 15 grains of Gelatin basis; to check bleeding piles.

P1 **Suppositories, Suprarenal with Morphine.**—These contain ¼ grain of Morphine Hydrochloride in addition. Useful for painful piles.

Suprarenal Ointment.—Liquid Extract of Suprarenal Gland 50 minims, Liquid Paraffin 2 drachms, Hydrous Wool Fat to 1 ounce. It may be scented with Otto of Rose.

Spray for the Nose and Throat.—For use in hay fever and coryza, contains 5% of Liquid Extract.

Hypodermic Injection. *Dose.*—1 to 5 minims.

Liquid Extract of the Suprarenal Gland is employed as such or diluted with Normal Saline Solution.

Surgical shock after chloroform anæsthesia should be treated by weak solution (1 of Suprarenal Extract in 50,000 to 1 in 160,000) used as continuous rectal irrigation at the rate of a pint an hour. The limit of fluid thus to be used is 8 pints, when employed intravenously not more than 3 pints is recommended.—Blumfield, Pr., Feb., '09,242.

Adrenalin. *Off.* (ADRENALINUM). *Syn.* **Adrenine.** P. BELG., FR. CX. (Tests are given, *q.v.*).

The empirical formula usually given is $C_9H_{13}NO_3$=183·159, *i.e.* $(OH)_2.\ C_6H_3.CH(OH).CH_2.\ NH.\ CH_3$.

It is an active principle of the Suprarenal gland, light brown or almost white powder or in grey crystals (first prepared by Takamine). It appears to maintain a proper degree of contraction of the arteries, and hence to correct blood pressure.

Soluble slightly in hot water, also more readily in Hydrochloric Acid, and Boric Acid Solution forming corresponding salts, also soluble in dilute alkaline solutions, but if alkali in excess, decomposition will occur. From concentrated solutions it is precipitated by alkali. Aqueous solutions of its salts are lævorotatory.

Insoluble in alcohol, ether, chloroform, petroleum ether and other organic solvents. It is stated to be soluble in oleic acid, but we do not find this a good solvent. Not precipitated by ordinary alkaloidal reagents. It is chemically a powerful reducing agent.

On heating above its melting point (263° C.) it decomposes with an odour resembling opium smoke.—FR. CX. B.P., 1914, states M.Pt. 205 to 212° C. with partial decomposition. We found (1914) Commercial Adrenalin to darken at 194° C. and melt at 204° C.

✱Hemisine (T.M. 250250), **Renaglandin, Suprarenin, Adnephrin, Paranephrin, ✱Renastyptin** (T.M. 257900), **✱Vaso-Constrictine** (T.M. 288888), and **✱Vasotonin** (T.M. 326554), are supplied in commerce.

Epinephrin is an allied blood pressure raising principle different chemically from suprarenin. Maben's Paper on the introduction and priority of Adrenalin.—P.J. i./07,388 : *see also* Vol. II.

In the preparation of Adrenalin the suprarenal capsules are reduced to pulp and macerated, excluding oxygen as much as possible, in warm (50° to 80° C.) water or very dilute acid for 5 hours, the mixture being then heated at 90° to 95° C. to coagulate albuminoids. This aqueous extractive is evaporated and extracted with alcohol. Precipitation from this liquid of impure Adrenalin follows by means of ammonia. It is purified by ether-alcohol, and re-precipitation with ammonia or fixed alkali.

Suprarenin — Ortho - Dihydroxyphenylmethylaminomethylcarbinol. *Syn.* Ortho-dioxyphenylethanolmethylamine, is a synthetic substance. *For notes on Manufacture and Patents see Vol. II.*, It is *optically inactive*, consisting of equal parts of dextro and lævo-suprarenin, but the latter termed **L.-Suprarenin** is supplied commercially as 'Suprarenin.' Its action is identical with that of Adrenalin. The splitting up of the racemic body into the + and — modifications has been effected by fractional precipitation of its salts with tartaric acid and by *Penicillium glaucum* (D.R.P. 222,451). L.-Suprarenin is in crystalline condition, insoluble in water except with the addition of an equivalent of an acid.

Suprarenin Hydrochloricum, P.G. V.—$C_9H_{13}NO_3.HCl$=219·627 may be prepared synthetically or occurs as Adrenalin, Paraephrin, etc.

Suprarenin Bitartrate $C_9H_{13}NO_3.C_4H_6O_6$ (F. Norsk). Has M. Pt. 149° C. One Gm. contains 0·55 Gm. of suprarenin. The natural as well as synthetic product is allowed.

Suprarenin Hydrochloride Solution 1 in 1,000 is prepared.

Suprarenin Tablets are prepared containing 0·001 Gm. ($\frac{1}{60}$ grain). One dissolved in 1 Cc. of Water or Normal Saline Solution produces a 1 in 1000 Solution.

Dose and *Uses.*—*Hypodermically* ½ Cc. of 1 in 1000 Solution is stated to be a maximum. *Per os.*—for internal bleeding 20 to 30 minims of the 1 in 1000 Solution. For ophthalmic use 1 in 5000 to 1 in 10,000 Solutions are used. For hæmorrhage of the bladder 1 in 10,000 Solution. *c.f.* also Adrenalin Solution, *infra.*

Incompatible with alkalis and solutions of Ferric Chloride.

Substances possessing an Adrenalin-like action have also been found in putrefying meat, *vide* **Hydroxyphenylethylamine.**

Uses of Adrenalin,—vide Adrenalin Chloride Solution below.

Liquor Adrenalini Hydrochloricus. Adrenalin Chloride Solution. *Syn.* GUTTÆ ADRENALIN. R.O.H. *Dose.*—10 to 30 minims (0·6 to 1·8 Cc.), by the mouth.

Adrenalin 1, Chloroform 5, Sodium Chloride 9, Dilute Hydrochloric Acid 3, Distilled Water, freshly boiled and cooled to 1,000.

The original preparation contains 1 of Adrenalin Chloride in 1,000 of Normal Saline Solution, with 0·5% of Chloretone.

Hypodermically 1 Cc. injections of the 1 in 1,000 Solution are given or it may be diluted with Normal Saline Solution 10 times (or less). Commercially a solution of strength 1 in 10,000 is made and other dilutions may be prepared freshly as required.

Sterilisation of Adrenalin in boiling water for even up to three hours does not affect activity. The natural Adrenalin product is more stable than the synthetic.—L. W. Rowe, P.J. i./14,755 ; Am. Jl. Ph., April, 1914,145.

Uses.

In hæmorrhage (*e.g.* in typhoid fever), hæmoptysis, and post-partum hæmorrhage. It controls the heart's action (like digitalis): 5 minims produce marked effect in cardiac failure. A few drops *locally* applied render the area blanched and bloodless. It has been injected with Cocaine and Eucaine *q.v.* to produce anæsthesia and restrain bleeding during surgical operations. Both these combinations have been applied to epitheliomatous growths and ulcers (*c.f.* also Suprarenal Gland, *antea*).

Epistaxis has been cured by packing nostrils with gauze dipped in Adrenalin Solution 1, Saline Solution 2.

Coryza and hay fever are relieved by a spray Solution, containing Adrenalin and Cocaine.

Post-partum bleeding is checked by swabbing uterus with a 1 in 5,000 solution.

It is injected (10 minims) in pleuritic effusion.

In nose operations, submucous injection of 10 minims of 1 in 10,000 solution with 5 minims of 1% Cocaine Hydrochloride is utilised to lessen blood flow.

Arthritis. Injections of 1 Cc. of 1 in 1,000 Solutions during 8 to

14 days. Curative.—Med. Klinik, Innsbruck, No. 11, 1913.

Acute asthma treated by spray.—C. Matthews, B.M.J., Feb. 19, 1910. See also B. Melland, L. May 21, 1910. ½ minim subcutaneously is enough in light attacks. Paroxysm instantly relieved.—A. Francis, B.M.J. ii./11,1327. In asthma hypodermic injection may work miracles.—O. Leyton, B.M.J. i./15,245. 2 minims may cause discomfort or alarming symptoms.—A. F. Hertz, B.M.J. i./14,965. Permanent reduction of blood pressure from its use.—A. Francis, B.M.J. i./14,623,1052. See also effects of hypodermic use.—W. Miller, L. ii./14,158.*

Collapse in diphtheria and in pneumonia has been treated by 0·5 to 1 Cc. injections every 1 to 2 hours. Intravenous injections of Saline (*q.v.*) with 6 to 8 drops of the Solution are practised.

Heart failure in diphtheria treated by oral administration of Adrenalin of value. Has also been given *per rectum*.—Rolleston, M.P.C., Oct. 13, 1909, p, 391. Also by Adrenalin Solution 5 minims with Atropine 1/100 grain and Strychnine 1/100 grain hypodermically every 4 hours.—B.M.J. i./12,535.

Pertussis.—Children have taken 1 to 3 drops *per os* or less according to age every 3 or 4 hours. Good effect.—G. V. Fletcher, B.M.J. ii./12,1748; ii./13,122; Luigi Carta Mulas, Gazz. degli Ospedali, No. 124, 1913; B.M.J.E. ii./13,80.

In cholera to encourage vasoconstriction.—Pres. Apl. 1913.

In plague the circulatory system is always affected. This may be due to pathological changes in the adrenal glands. 30 minim doses of the solution with Strophanthus Tincture *per os*. Symptoms of heart failure disappeared.—F. N. Thornton, L. Apl. 9, 1910.

Intractable vomiting, *e.g.*, of pregnancy or post anæsthetic treated.—Pres. Apl. 1913.

Possible danger.—An anæmic boy of 15 had his nose packed with gauze soaked in 20% Cocaine Hydrochloride and 1 in 4,000 Adrenalin half an hour before operation for hypertrophied turbinates and adenoids. Patient collapsed under further injection of 5 minims of 1 in 1,000 solution. The symptoms may have resulted from anæmia of the bulb.—J. Allan, Pres., 1913.

Intractable hiccough treated with Adrenalin after Bromide, Chloral, Chloroform and Cocaine in turn had been found of no avail. In a fit of violent and painful hiccough lavage with Silver Nitrate and general anæsthesia under Chloroform were equally unsuccessful, —finally two doses of 10 drops of Adrenalin Solution caused it to cease.—P.J. ii./13,808; C.D., Jan., 10, '14.

Intravenous injections of Adrenalin are effective in doses of 1/10 mg. Hypodermic injections are irregular as only a small amount is absorbed. Given *per os* also uncertain, intravenously at an opportune moment may be life-saving in severe hypotension caused by toxæmia, or temporary circulatory failures such as Chloroform syncope. Effects lasting six, to eight hours are iobtained by injecting 6 to 8 drops of Adrenalin Solution in 1,000 Cc. of Saline nto a vein in the space of 20 to 30 minutes.—Pr., June, '13,1017.

The Pituitary, thymus, ovary, muscle and kidney extractives in addition to Adrenalin (*v.* Vol. II.,) are mydriatic but not the thyroid.—D. M. W. Jan. 31, 1911.

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* **Evatmine** contains Adrenalin and Pituitary.

Profuse hæmorrhage from the kidney satisfactorily treated by injection of Adrenalin—5 Cc. of a mixture of equal parts of Adrenalin (solution) and Saline Solution into the renal pelvis.—L. ii./13,752.

A new vaso constrictor from the blood and the adrenal cortex is described —P.J. i./14,66.

Blood pressure is not permanently raised by use of Adrenalin though many think so. A. Francis found that immediately after an injection there is a rise of 5 to 20 m.m. pressure which is followed by a fall which brings it below its original level. In every case in which he has seen Adrenalin frequently used a permanent reduction of pressure has resulted. In one case a patient having had several thousand injections had a pressure below 100 m.m.—B.M.J. i./14,623,1052.

In gastric ulcer probably the best drug to control hæmorrhage. To raise blood pressure in shock and in pneumonia repeated small doses—1 Cc. of 1 in 1000 every hour required.—O. Leyton, B.M.J. i./15,245.

Adrenalin in Chloroform anæsthesia, see p. 284.

Braun considers that Adrenalin should be injected in very dilute solution, the maximum *dose* being 0·5 mgr., *i.e.*, 0·5 Cc. of the 1 in 1,000 Solution diluted with 50 to 200 Cc. of a Cocaine Solution.

Decoloration of Solutions—The solution is liable to turn brownish on exposure. Loss of activity is proportional to this colouration. In the early stages no appreciable loss of strength results and it is not until the product actually turns brown and begins to precipitate that it loses much of its efficacy. —P.J. i./11,90.

In some experiments which we conducted we found that a small quantity of formalin added retards the colouration of Adrenalin solution.

Adrenol Solution.—A stable and efficacious solution of the Adrenal active principle in oily solution. Suitable for spray with an oil atomiser on to the mucuus membrane in throat and nose cases. Dissolve Adrenalin 1 in a mortar with Alcohol 7 and Hydrochloric Acid *q.s.* (0·2 of actual HCl=0·6 of P.B. Acid approximates theory: we find in practice a little more may be necessary), then add Absolute Alcohol *q.s.* to 12·5 and make up to 1,000 with Castor Oil. Eucalyptol 5 may be incorporated if desired. This preparation is based on Gunn and Harrison's method in P.J. ii./07,310.

Adrenalin Inhalant.

A special preparation containing Adrenalin Chloride 1 in 1,000 made with aromatised Hydrocarbon Oil. Is soothing and astringent in inflammatory affections.

For use as spray the Adrenalin Chloride Solution in Normal Saline diluted to 1 in 2,500, or even 1 in 5,000 parts, is effective in the nostrils or within the uterus.

Adrenalin Tablets are made containing $\frac{1}{65}$ grain (0·001 Gm.) and $\frac{1}{200}$ grain (0·0003 Gm.).

P1 ***Codrenine.** (T.M. 276398).

Dose.—15 minims, one half to be injected in front and the other behind the tooth, as near the periosteum as possible two or three minutes before extraction. A solution 1 Cc. of which contains Cocaine Hydrochloride 0·02 Gm ($\frac{1}{3}$ grain) and Adrenalin 0·00006 Gm. ($\frac{1}{1000}$ grain). A local anæsthetic and hæmostatic. Successful in dental work for painless extraction. For local anæsthesia over large area dilute 1 volume with 9 volumes of Normal Saline.

P1 **Sterules, Hypodermic** of Cocaine Hydrochloride $\frac{1}{3}$ grain with Adrenalin $\frac{1}{1000}$ grain in 15 minims for dentists' use are prepared.

P1 **Tablets of Adrenalin** ($\frac{1}{300}$ grain), with Cocaine Hydrochloride

($\frac{1}{6}$ grain) are prepared for dental use. They will fit into cavities where pulp has to be extirpated, or may be dissolved in 15 to 30 minims of water forming a solution suitable for ordinary cases.

Ⓟ✻**Eusemine.** (T.M. 290546). A solution of 5 of Adrenalin Chloride solution 1 in 1,000, and Cocaine Hydrochloride 0·75 in Normal Saline Solution 100.

✻**Anæstiform** (T.M. 264063) (Patented).—*Dose,* 15 minims containing 1/8 grain Cocaine Hydrochloride.

A Solution containing Renaglandin, Cocaine Hydrochloride, Sodium Sulphate and Serum Albumin. The latter is stated to delay the absorption of Cocaine. The Sodium Sulphate increases the penetrating power of Cocaine, but the albumin localises its effect and lengthens anæsthesia. 15 minims of the solution said to produce an effect equal to $\frac{1}{2}$ grain Cocaine Hydrochloride in ordinary aqueous solution. In dental extractions and in general surgery —D. Lloyd Smith, L., June, 1906.

Sterules, Hypodermic of Adrenalin Chloride Solution (contain 10 and 15 minims) with elongated ends, which may be snapped off; these are a great convenience, particularly in dental work to check hæmorrhage after tooth extraction.—B.M.J. i./03,849.

The 15 minim size are for use with the β-Eucaine Powders in **Infiltration Analgesia.**

Adrovaine Sterules contain Adrenalin 0·00025 Gm. ($\frac{1}{250}$ grain). with Stovaine 0·02 Gm. ($\frac{1}{3}$ grain). **Hypodermic Tablets of Adrovaine** are also made same strength.

Sterules, Ophthalmic of Adrenalin Chloride Solution are prepared. In these the activity of the solution persists, in all probability for years, owing to their being hermetically sealed.

Adrenalin Lamellæ for ophthalmic use are prepared containing $\frac{1}{1000}$ and $\frac{1}{500}$ grain in each.

Styptic Gelatin.

Gelatin $1\frac{1}{2}$ grains, Adrenalin Solution 15 minims, Water *q.s.* to 60 grains—this quantity for a dose; contains Salicylic Acid 1 grain to the ounce to preserve. Suggested for internal hæmorrhage.

Suppositories, Hollow, of Cacao Butter are prepared, containing 10 minims of the Solution (15 and 30 grain size). As also 1 in 1,000 of the Adrenalin Chloride in the Theobroma mass. For hæmorrhoids.

P1 **Suppositories of Adrenalin, Cocaine, Hamamelis and Formidin** contain Cocaine Hydrochloride $\frac{3}{4}$ grain, Hamamelis Extract 3 grains, and Formidin 3 grains. Germicidal, analgesic and tonic astringent.—L. ii./09,302. They may be made 15 grain size with 1 of Adrenalin in 1,000 of the basis.

Adrenalin $\frac{1}{24}$ grain in a 30 grain cacao butter suppository was found to prevent it from melting freely at body temperature.—P.J. ii./09,391.

Trochisci Adrenalin contain each:—Adrenalin, $\frac{1}{1000}$ grain; Heroin, $\frac{1}{100}$ grain; Ipecacuanha, $\frac{1}{50}$ grain; Red Gum, 2 grains; Otto, *q.s.* These are astringent and sedative.

Unguentum Adrenalin. Adrenalin base 1, Lanolin Ointment 5,000, scented with Geranium Oil. Useful in the nostril in acute coryza and inflamed mucous surfaces.

In neuralgia, neuritis and reflex or referred pain,—small quantities rubbed in with advantage.—M.A. 1908,2.

P1 **Adrenalin Catheter Lubricant.**—Adrenalin (base) 1, Cocaine 10. Atropine 10. Dissolve the Adrenalin in Hydrochloric Acid (*Off.*) *q.s.* (0·6 is usually sufficient) diluted with Absolute Alcohol 30, Dissolve the alkaloidal bases in Oleic Acid 20 and mix this and the Adrenalin Solution with sufficient Castor Oil and Absolute Alcohol in proportion of 4 to 1 to make 1,000 of the lubricant.—B.M.J. ii./07,859.

Adrenalin Gauze.—Gauze impregnated with Adrenalin Solution, at the time of use, for local application.

Adrenalin Tape ½ inch wide in 10 yard lengths, also 1½ inch wide in 5 yard lengths, in glass jars.

A death under Chloroform, Ether and Adrenalin Solution in an operation on the nose.—M.P.C., Oct. 20, '09,413.

Vomiting of pregnancy well treated with Adrenalin. Adrenalin in doses of 10 drops of 1 in 1,000 solution twice daily in the case of a woman in an exhausted condition at her third month. Abortion, previously decided on, rendered unnecessary.—Pres., 1910, p. 9.

Isoamylamine and **para-hydroxyphenylethylamine** (*q.v.*) are pressor substances like Adrenalin found in putrid meat and Ergot. Unlike Ergot the pressor action is produced when taken by the mouth. The action though less marked is more prolonged than of Adrenalin.—B.M.J. ii./09,540.

***Epinene.** (T.M. 320407). *Syn.*—3-4 DIHYDROXYPHENYLETHYLMETHYLAMINE. $(OH)_2.C_6H_3.CH_2.CH_2.NH.CH_3=167{\cdot}159$ was obtained by Pyman [J.C.S. 97 (1910) 264] from 1-Keto-6-7 dimethoxy-2-Methyl-tetrahydro-isoquinoline by heating it with Hydrochloric Acid at 170 to 175° C.

It differs from Adrenalin by the absence of an aliphatic OH (*c.f.* formula). The compound is in colourless crystals melting at 188 to 190° C. and forms crystalline salts with acids. It is supplied commercially in solution 1% strength,—this being diluted with Normal Saline as required. It resembles Adrenalin in action, but the rise of blood pressure though not so intense is said to be more prolonged.

It is stated to accelerate and strengthen heart action, to cause contraction of the pregnant, and inhibition of the non-pregnant uterus of the at, to dilate the pupil and stimulate the secretion of saliva. A 1 in 1,000 solution produces marked and sustained pallor of the conjunctival mucous membrane when instilled into the eye. It is used to produce local anæmia—to arrest blood flow. For use in ophthalmic work 0·1%, as a styptic to bleeding surfaces 0·01 to 1%, hypodermically 0·01% and intramuscularly 0% solutions are used.

Testis.—The use of an extract from the testicles of animals was asserted to reanimate sexual power.

Liquor Testicularis, Orchitic Fluid. *Syn.* ORCHIDIN, TESTICULIN.

Dose.—15 to 30 minims hypodermically, or by the mouth.

Prepared from the testes of animals (preferably guinea-pigs), by maceration with glycerin and subsequent filtration under pressure in contact with carbonic acid, by d'Arsonval's process.

Has been tried for anæmia with irregular menses—injections made between periods, preferably into muscular substance.

In neurasthenia has been found helpful.—L. ii./13,1455.

Sterules of **Testicular Extract** 10 minims with **Sodium Glycerophosphate** 2 grains and **Strychnine Hydrochloride** 1/60 grain are prepared.

Tablets of Didymin (Testicular substance), 5 grains.

*__Sperminum__ (Poehl). (T.M. 222191). Said to be allied to Diethylenediamine (Piperazin) Is obtainable in 2% solution in capsules containing about 1 Cc. for *hypodermic injection.*

Spermin Essence (Poehl) for internal use.

Dose.—20 to 30 drops twice daily.

These preparations have been tried for the relief of anæmia, debility, diabetes, impotence, tabes dorsalis, and neurasthenia with varying results.

*"**Lymphoid** (T.M. 337965, 337966) **Compound Capsules,**" Testicular Lymphatic Glands, with Brain and Spinal Cord Extracts 2 grains, Iron Glycerophosphate $\frac{1}{2}$ grain, Sodium and Calcium Glycerophosphates 2 grains, Aloin 1/20 grain—in each capsule. *Also obtainable without the glycerophosphates and without Aloin.*

Dose.—One capsule thrice daily or less $\frac{1}{2}$ hour before meals.

This preparation has been used in neurasthenia and general debility, melancholia, malnutrition, neuritis, impotence, insomnia, neuralgia, rheumatic affections, diabetes mellitus, epilepsy and kidney diseases.

"**Lymph Serum.**" *Syn.* *Lowenthal's Lymphoid Serum. (T.M. 334796, 337965, 337966, 346373). (For Hypodermic use only.)

Dose.—10 minims (0·6 Cc.) daily in the gluteal region.

Contains Orchitic fluids, Extracts from Lymphatic Glands, Spinal Cord and Brain, together with Gold Chloride and Sodium Chloride ($\frac{1}{50}$ grain to 10 minims) as preservative. Microscopically it is stated to show spermatozoa, leucocytes, crystals of Lecithin, Nucleinic Acid and Spermin.

Uses.—The same as the Capsules, but it is intended for the more severe cases and in those of long standing.

Parry has reported on the analysis of these preparations.

Said to be obtained by the extraction of lymphatic fluid from the glands of young goats and bulls.—Pr. Feb., 1911, p. 327.

Thymus Gland, Desiccated.

Dose.—3 to 10 grains (0·2 to 0·6 Gm.).

One grain of this powder represents 8 grains of the fresh gland of the calf. Has been given to improve the defective nutrition in childhood, Graves' disease, hæmophilia, for anæmia, chlorosis and leucocythæmia, urticaria in cancer, rheumatoid arthritis, and diabetes, and in tachycardia.

Tablets, 3 and 5 grains : of value in rickets.—B.M.J.E. i./02,40.

C. G. Kerley and S. P. Beebe, Am. Jl. Med. Sci., Aug., 1912, reported a remarkable case of growth improvement in a child with 15 grain doses of Desiccated Gland.

In infantile paralysis Thymus Gland is indicated. A child can take 15 to 20 grains in 24 hours.—W. MacKenzie, B.M.J. i/15, 63.

Liquid Extract of Thymus Gland. 1=1.

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

A. E. Garrod.—Clinical aspects of the thymus gland.—B.M.J. ii./14,571.

Acidum Thyminicum. *Syn.* ✱**Solurol.** (T.M. 264148). Nucleo-tin-phosphoric acid. *Dose.*—5 to 10 grains (**0·3 to 0·6 Gm.**) after meals.

Approximate composition :—$C_{20}H_{35}N_3O_{16}P_2$ (Kossel) = 635·49. Minkowski has $C_{30}H_{46}N_4O_{15}2P_2O_5$ = 986·718. A product of the metabolism of the nucleins present in food containing nucleo-proteins, *e.g.*, thymus gland, pancreas, spleen, etc. It possesses affinity for and solvent action on, Uric Acid. Uric Acid formed in the body without its equivalent of Thyminic Acid is stated to be precipitated. It is, therefore, employed in the treatment of gouty affections ; 1 of the acid will dissolve 1·3 of Uric Acid at 100° F. *in vitro.*

It has no especial incompatibilities when in solution. Feebly acid, but as far as uric acid is concerned it probably acts as a base. It is thought to be non-toxic and non-depressant. Has been given in 2 grain doses by **intra-muscular injection** in severe gouty affections, especially neuritis.

Soluble with ease 1 in 5, stronger solutions may be prepared, but it is mostly prescribed as **Thyminic Acid Tablets,** 4 grains, and in Cachets.

Thyroid Gland.

One lobe (½ gland) we find weighs on an average about 35 grains and yields about 9 grains of dry thyroid.

This gland, and preparations made from it, have been employed for relieving myxœdema, cretinism, lupus, psoriasis and chronic eczema. The methods employed have been (1) by feeding with the glands ; (2) by grafting (Victor Horsley, B.M.J. i./90,287 ; ii./90,201) ; (3) by the exhibition of the official **Thyroid Solution** by the mouth or hypodermically ; (4) by **Dry Thyroid** in powders, cachets or tablets. Success has been most notable in cases of myxœdema in which prolonged treatment is necessary ; obese and insane persons and weak-minded children have also improved under its use.

The action on administration of thyroid gland preparations is (1) a stimulating one—metabolism is increased by a process of katalysis ; and (2) the production, by means of the parathyroid tissue present when sheep's gland is used, of a substance which has the effect of neutralising the toxic results of this metabolism.

It should be noted that the Thyroid preparations on the market (mostly made from sheep's thyroids) are obtained from parathyroid as well as thyroid tissues ; deficiences, therefore, in both these glands in man are met by feeding with these preparations. Signs of thyroidism must be carefully watched for during administration of Thyroid preparations.

Historical review of Thyroid gland treatment of myxœdema and cretinism. The original case of myxœdema first treated (hypodermically) 22 years ago (by Murray) with Liquor Thyroidei was alive and well at the time of this communication. This health had been maintained by 10 minims of the Liquor each day—6½ ounces in the course of the year—less than a gallon in 22 years. As to other uses of Thyroid the marked emaciation caused by excessive secretion in exophthalmic goitre indicates its employment in obesity—in some cases good results—with adequate diet. Also sometimes valuable in rickets, rheumatoid arthritis and nocturnal enuresis. As it improves the skin in myxœdema it has been used in psoriasis and other cutaneous diseases.—G. R. Murray, B.M.J. ii./13,163; L. ii./13,201.

In exophthalmic goitre Thyroid is totally unsuited—it aggravates the condition.—B.M.J. ii./05,1249; i./09,384, *c.f.* Potassium Iodide. Arsenic and Ergot internally with Iodine locally reduced the swelling in a case but it returned, subsequently surgical measures produced good effect.—L. i./11,735.

Use of Suprarenal gland is successful, *v.p.* 924.

Myxœdema on the other hand is speedily improved by Thyroid and a more or less complete cure is established. 'The results,' says Osler, 'are unparalleled by anything in the whole range of curative measures. Within a few weeks a poor feeble-minded toad-like caricature of humanity may be restored to mental and bodily health.'

V. Horsley had previously to Murray's work practised transplantation of sheep's thyroid gland into the tissues of a myxœdematous patient. Later McKenzie showed internal use of Thyroid preparations equally good.

The treatment consists in supplying a necessary element for proper metabolism which is withheld by the absence or disorganisation of the thyroid gland. The patient must continue to take the preparation more or less all his life. In rare cases in which thyroid treatment upsets the patient pilocarpine hypodermically in ⅛ to ¼ grain doses should be tried.—Guthrie Rankin, Pr., Feb./09,211.

Over-doses of Thyroid preparations may cause rapid pulse, 'racing' of the heart, feverishness, headache, pruritus, and even delirium. Chronic thyroid poisoning has also been observed—the symptoms being emaciation, muscular weakness, loss of hair, dilated pupils, and general debility.

Thyroid, Excessive use of (Police Court Case).—L.i./12,751.

Thyroxin.—This name has been given to an active principle which is present in very small quantity—1 Gm. per 100 kilos of fresh glands. It is described as 4 : 5 : 6—hydro—4 : 5 : 6—iodo—2—oxy—β—indol propionic acid of the empirical formula $C_{11}H_{10}NO_3I_3$. It has been found that during the months of January, February and March the glands contain only a slight percentage. During the summer the increase is 400%. For method of extraction *see* E. C. Kendall, Jl. Biol. Chemistry, Vol. XXXIX. (Abst. C and D, March 27, 1920, p. 404.

J. Huxley at Oxford has recently given out the results of the experiments with a preparation of this kind and has stated that low forms of life, *e.g.* tadpoles, under treatment with it develop to the adult stage with greater rapidity than those without it. It might be utilised, the speculation goes, in influencing the sex of the offspring in man.

Liquor Thyroidei, THYROID SOLUTION (B.P. 1898).

Dose.—5 to 15 minims (**1·3 to 1 Cc.**), freshly prepared. 100 minims represent one entire gland.

It is better to add glycerin 15 to 20 of the sliced and bruised tissue, macerate 24 hours, press, and make up to the required volume with glycerin and water *partes æquales.*—P.J. ii./02,140. Mixtures should be prescribed with Chloroform Water.

Flavoring.—Glyl or Syl Aurantii Floris, Glyl or Syl Amygdalæ Amaræ; Syrupus Limonis.

Assay.—*The author suggests Standardisation with a content of* **0·025 Gm.** *organically combined Iodine per* 100 *Cc. vide Vol. II.*

Thyroideum Siccum, DRY THYROID (*Off.* and B.P. '98).

Dose.—½ to 4 grains (**0·03 to 0·25 Gm.**), in cachets.

Should not exceed 15 grains daily.—W. W. W.

Prepared from healthy fresh glands of sheep; the surrounding fat, etc., is first removed; the glands are finely powdered after drying at not exceeding 40° C.; and finally the substance is freed from fat by Ether percolation. (One part represents about 5 of fresh gland).

Relation between doses of Liquor Thyroidei and Thyroideum Siccum.

N. H. Martin pointed out that:—

5 to 15 minims of Liquor Thyroidei = 2½ to 7 grains of fresh gland,
3 to 10 grains of Thyroideum Siccum = 11 to 35 grains of fresh gland,
and, therefore, that the dose of Dry Thyroid is about five times too strong in proportion to that of liquor. If reckoned on iodine content the dose of dried thyroid is about ten times too strong in proportion.—P.J. ii./12,145.

Assay.—*The author standardises this preparation to* 0·2% *Iodine in organic combination.* U.S. has this as average, P. BELG., 0·03%. *For details see Vol. II.*

Thyroid "**Extract**" is an unfortunate name to indicate Thyroideum Siccum (*Off.*). The fresh glands basis also introduces grave misunderstanding. Myxœdema, a case did no good with a course on the latter basis but when dosage of Thyroideum Siccum was given there was improvement at once.—A. E. Carver, B.M.J. ii./17,515. W. H. Martindale, in support of this letter draws attention to the necessity of standardising Thyroideum Siccum.—*Ibid.* 570. See also A Goodall B.M.J., i./14,1351.

Standardised Thyroid Tablets, 1½ and 5 grains (**0·1 and 0·3 Gm.**).

Standardisation on these lines appears to be a wise course.—B.M.J. i./13,1278.

We now discard the old fresh substance basis for Thyroid Tablets as being unscientific and misleading.

***Thyroglandin.** (T.M. 279708). A dry thyroid extract prepared for the treatment of obesity and myxœdema. *Dose.*—3 to 5 grains.

Pills 1 grain and tablets 2 grains are prepared.

Thyroprotein (Beebe) is described as consisting of proteins of thyroid glands, adjusted to a content of 0·33 per cent. of iodine. Two-grain tablets are made containing 1, 2 and 5% of Thyroprotein.

The 1 and 2% are used in goitre. *Dose.*—One tablet, thrice daily. The 5% tablets are used in metabolic disorders, skin diseases, etc., myxœdema.—Pr., June, 1912, 892.

'Four Gland' Tablets. *Syn.* COMPOUND THYROID TABLETS. *Martindale. Dose.*—One or two twice daily for adults,—young children in proportion.

These Tablets contain 1 grain each of Thyroid, Thymus, Suprarenal and Pituitary Gland substance.

A treatment in mental and physical deficiency based on the therapeutic action of the internal secretions—the *combined action* of the internal secretions is aimed at. Correlated action in various diseased conditions between the thyroid and thymus gland, the suprarenal gland and the pituitary gland, etc., is proved also between the thymus and the suprarenals and testicle and ovary, also between the suprarenal, pancreas and pituitary and so on. In short, physical, mental and metabolic changes occur as result of interference with the internal secretion of nearly all the ductless glands

The above tablets have been given in myxœdema, in cretinism and infantilism with good mental and promising general results. Active rickets improved by half a tablet twice a day. Tablets containing extracts of the pancreas, testes and ovary also suggested.—A. S. Woodwark, St. Bart.'s Hosp. Rep. Vol. XLVIII.

Sir J. Cantlie attributes puffiness in various parts of the body and associated depression in women to the open chest clothing so much on the increase. He has had excellent results in such cases with these tablets.

'Three Gland' Tablets—omitting the suprarenal gland—have also been employed on the same lines.

Elixir of 'Four Glands,' *Martindale,* is also prepared. *Dose.*—1 to 2 drachms = 1 to 2 'Four Gland' Tablets.

Elixir of 'Three Glands,' *Martindale. Dose.*—1 to 2 drachms = 1 to 2 "Three Gland" Tablets.—These Elixirs have also been employed in the same conditions as the Tablets.

For a study of the effects of the ductless glands upon development, see H. Gilford.—L. ii./13,718.

Pluriglandular Extract. *Dose.*—(hypodermically) 1 Cc. *pro die* into the gluteal region,—the part being frozen with Ethyl Chloride if necessary prior to use.

A Glycerin Extract of Thyroids, Parathyroids, Ovaries and Pituitaries of intact sheep of unquestionable health, *four years old,* and testicles from perfectly sound cocks one and a half years old has been used as a general upbuilder and where effect on metabolism is required. In neurasthenia and impoverished nerve tone and in locomotor ataxia, with promising results.—F. R. Starkey, Pres., Apl , 1913,103.

***Hormotone** (T.M. 365396) is described as a combination of hormones derived from the thyroid, pituitary, ovary, testis, pancreas and spleen. Each Tablet contains 1/20 grain of desiccated Thyroid and pituitary. *Dose.*—One or two tablets thrice daily before meals ; not more than six per day. Stated to favour metabolism and increase mental, nerve, and muscular activity.—L. ii./13,84. **Hormotone without Post-Pituitary.** Tablets are also made for use in neurasthenia associated with high blood pressure and all hypertensive conditions.

References to Thyroid Treatment.

Iodine (first found by Baumann in 1896), and Bromine, have been found in sheep's thyroid glands. Arsenic has been mentioned by Gautier as a constituent, but is probably not a normal constituent.

It is worthy of note that arsenic and iodine were used in the treatment of myxœdema long before these were found in the thyroid gland.

Myxœdema, mild cases, should be treated with 5–10 minim doses of Liquor Thyroidei each night. The latter dose is thought to be the amount corresponding to the daily output of thyroid secretion from an average normal gland, *i.e.*, in a case in which there was believed to be no further active portion of the gland remaining, this dose taken six nights in the week kept the patient free from myxœdema for 17 years.—B.M.J. i./09,382 ; see also Hall White, L. i./13,154.

Numberless reports of the relief of myxœdema and cretinism have been recorded. Opinion varies as to its value in obesity.

Summary of results of use in the insane, satisfactory.—L. ii./94,846 ; B.M.J. ii./00,815. Twelve cases out of 22 recovered.—M.P.C., 1905,131.

Has been used successfully in lupus, psoriasis, in pityriasis rubra, ichthyosis and alopecia.

Acromegaly improved.—B.M.J.E. i./96,51 ; L. ii./96,614.

Tends to assist the development of backward children.—B.M.J. i./98,618.

Apathy may follow the use of thyroid.—B M.J. ii./00,582.

Hæmophilia controlled by the liquor.—B.M.J. ii./00,1375.

In auto-intoxication of pregnancy and impending eclampsia. Full doses.—L. ii./03,307.

In arterio-sclerosis thyroid preparations are very useful.—B.M.J. i./06,121.

Hay fever:—1 to 3 tablets daily will benefit.—M.A., 1908, 37.

In chorea of pregnancy no definite result.—B.M.J. ii./06,1131.

Dercum's disease treated by 5 grain doses thrice daily. After two weeks reduced pain and alleviated numbness and tingling and reduced size of swelling.—B.M.J. ii./09,516.

Cases treated by thyroid (the thyroid body appeared to be atrophied) and by Pituitary Extract. The former seemed to do good and control the increase in size of the parts, but worried the eyes somewhat,—the latter had no effect.—P.R.S.M., Nov., '10, Clin. Sect., p. 3. See also other cases.—Adiposis dolorosa (?) in which thyroid was taken with benefit, *ibid.*, p. 6.

Chronic subcutaneous fibrosis treated by thyroid gland (or Liquid Extract of Fucus) diabetic diet, exercise and massage. Unless the obesity can be reduced, the prospects of improvement are slight.—B.M.J. i./11,354.

In amenorrhœa a valuable drug. The function of the thyroid is (just before onset of menstruation and early in pregnancy) to stimulate calcium excretion which may take place from the uterus or failing that from kidney or bowel.—B.M.J. i./09,597. Dysmenorrhœa and even amenorrhœa are often marvellously benefited.—H. Ewan Waller, Pr., Aug., '12,279.

In epilepsy thyroid deficiency has been observed and the Extract advised.—Pres., Jan., 1911, p. 4.

In rheumatoid arthritis. A case suggested thyroid insufficiency by the rough dry harsh skin, crisp hair, husky voice, deep suprasternal notch, prominence of the trachea and apparent absence of the thyroid gland. 5 grain doses with adjuvant treatment, *v. infra*, produced remarkable result in a month. In another case where the gland could not be detected, an elderly man whose metacarpo-phalangeal joints were greatly enlarged with pulpy synovial membrane and partial palmar dislocation of the joints, and whose knees and elbows were in similar condition—was much improved by three months treatment. The adjuvant consisted in passive movement, massage of the neighbouring muscles (*not* the joint) and Liniment of Mercurial Ointment 2 drachms, Oleum Nucis 4 ounces, Methyl Salicylate 1 drachm.—B.M.J. ii./10,1770; see also L. i./10,643.

Enuresis in a case had been thought to be due to adenoids—these were removed but without effecting any good. Thyroid gland in small dose however, night and morning caused immediate cessation of the trouble.—Pr., Nov./09,719. *Dose—e.g.* 1 to 3 grains night and morning and more frequently. Enuresis thought to be due to deficiency of thyroid secretion. 25 cases, many of them of severe enuresis, in 24 of which complete success.—L. i./09,1247; M.P.C. ii./11,540

Atropine as good if not better.—L. ii./11,1619.

Tetany following an accidental overdose of the Thyroid Extract in the case of a child aged 3 years and 2 months presenting signs of cretinism. 1 grain thrice daily increased to 2½ grains was prescribed. All went well until the child secured 5 × 5 grain Tablets and swallowed the lot. Pronounced signs of tetany, characteristic 'accoucheur hand' and arched foot produced, tetany possibly due to influence on Calcium metabolism.—B.M.J. ii./10,1523.

Eczema of infants. Suggestion for use in obstinate, and where the thyroid is thought to be functioning badly—well borne even by young infants and has proved successful.—Pres., June, 1911, p. 163.

In eczema of infants and young children initial dose of Thyroid ought not to exceed ¾ grain gradually increased, if necessary, after ten days to 1½ grains. Larger doses only in the case of older children. Errors in diet, etc., are responsible for eczema of this type especially in infants brought up by hand, but some are undoubtedly due to an arthritic diathesis of the parents and in these the thyroid treatment does good.—B.M.J.E. ii./11,48.

"X" Rays on thyroid glands (Rabbits),—effects.—B.M.J. i./12,28.

Good results are obtained in all cases of thyroid inadequacy with small doses of thyroid. It is a good plan to observe a patient's susceptibility by beginning with ⅓ grain daily for a few days then ⅔ grain until by the tenth day the patient is taking 2 grains daily, the treatment should then be suspended for five days and recommenced with 2 grains for the first two days, increasing to 4 grains and continuing for ten days, followed by a repose of five days. The addition of sodium bicarbonate (15 to 40 grains daily) is said to promote tolerance of the treatment. Any acceleration of the pulse above 100 is an indication to stop treatment.—Pr., June '12,855.

Parenchymatous goitre.—Subjects to this disease often suffer much from constipation and simple attention to the bowels will often cause shrinking of the tumour by withdrawing fluid from it. Arsenic or Thyroid Extract forms the treatment.—J. Berry, L. i./13,737.

Eclampsia should be treated prophylactically with thyroid. Relief of giddiness, swelling and check to albuminuria pronounced.—B.M.J. i./13,1272.

The ultimate effect of the activity of the thyroid *in situ* is to raise the blood pressure, and the same result is produced by administering Thyroid Extract. Gross misuse of Thyroid Extract has occurred through its recommendation as a means of reducing blood pressure.—H. Ewan Waller, Pr., May, '13,881.

Dental caries has been shown to depend largely, if not entirely, on the condition of this organ. Administration of thyroid in cases of lime deficiency causes the return of alkalinity to the saliva by rendering the calcium of the body available for salivary secretion.—Brit. Dental Jl., Jan. 1, 1912, per Pres., Jan., '13,8.

In skin affections, psoriasis, alopecia, ichthyosis and xerodermia of unknown origin palpate the thyroid. If the gland is smaller than usual try thyroid.—B.M.J. i./13,1037.

To increase weight in children Thyroid Extract is frequently valuable.—Pres., March, 1913.

Dupuytren's contraction believed to be indicative of thyroid insufficiency. Thyroid gland thought to have improved cases. 1½ grains daily and in one case 163 doses were given.—K. Black, B.M.J. i./15,328.

Para-thyroid Gland.

These are four minute bodies embedded in the thyroid. Sir E. Sharpey Schafer states their internal secretion possesses hormones which exert a powerful influence on the nervous system.—B.M.J. ii./12,597.

The parathyroid glands are as essential to life as the thyroid. On experimental removal, in addition to causing tetany and death in a few days, it has been stated that the lime content in the tissues is reduced, there is increased Calcium and Nitrogen excretion, increase in amount of absolute and relative Ammonia in the urine and increase in the Ammonia content of the blood. It is also held that whilst thryoid secretion promotes metabolism parathyroid substance renders the products formed innocuous.

Some hold that the gland under discussion is simply undeveloped thyroid tissue capable of becoming functionally active in certain circumstances. Very little is known of the results of disease of these organisms in man—their importance is possibly over-estimated. Further investigation is necessary to determine their real function.—G. R. Murray, B.M.J. ii./13,167.

Uses.—Parathyroid is indicated in tetany, tetany of pregnancy, epilepsy, paralysis agitans, eclampsia and tetany of childhood.

Desiccated Para-thyroid Gland.

Dose.—1/60 grain (**0·001 Gm.**) to 1½ grains (**0·1 Gm.**) thrice daily.

The fresh parathyroid gland weighs on an average 0·09 Gm. This yields from 0·015 to 0·02 Gm. of desiccated powder, *i.e.*, 1=5 approximately of fresh substance.

Exophthalmic goitre is said to have been improved under dosage of 10 to 12 glands daily.

Parathyroid glands are not responsible for exophthalmic goitre. Surgical treatment is not to be directed against them; but to perverted condition in the thyroid.—B.M.J. ii./06,1286.

Thyroidectin. *Dose.*—5 grains in capsules. The dried blood of thyroidectomised animals.

To neutralise excessive thyroid secretion, which is thought to cause the symptoms of Graves' disease and goitre, the serum of thyroidectomised animals has been given, supposing this to contain in excess the harmful principles which should be neutralised by the thyroid secretion

Thyroidectomised Goat's Milk.

Graves' disease has been treated with this with good result. It would appear better to administer the dried serum and corpuscles of the thyroidless animal.—L. i./09,1041.

Large amounts of the milk, *e.g.*, a quart per diem can be given in this way. The tremors of Graves' disease are suggestive of the tremors occurring after total excision of the thyroid and parathyroids, and as Calcium is of immense importance in the treatment of these it is advisable to give it in Graves' disease.—The best way to do so is to give milk—either cows' or goats', but there is no strong evidence that the milk of a thyroidless goat is better than that of a normal goat. Moreover the theory on which the antithyroid treatment is based is not above criticism. Removal of the thyroid gland in goats must tend to produce, indeed sometimes does produce, myxœdema, this tendency should cause an antimyxœdema body to be found,—this would be a pro-thyroid body and tend to make Graves' disease worse again. Graves' disease is not infrequently followed by myxœdema and in some the symptoms of the two diseases coexist. In long standing cases, therefore, we may have to treat not hyperthyroidism itself, but its permanent secondary effects combined very possibly with a certain amount of hyperthyroidism.—W. Edmunds, L. ii./11,1618.

Thyroidectomy of animals is usually stated to be the percursor of changes in the blood and tissues resulting in a condition of general myxœdema. This is contradicted. Two goats thyroidectomised to provide milk sustained no ill effects.—P.J. ii./12,226.

Bebe's Thyroid Serum.—Obtained by injecting rabbits with both nucleoprotein of the thyroid and thyreoglobulin. The serum obtained is tested by its agglutinating and precipitating power on thyroid and protein fragments. (By experiments it was shown that if a tissue nucleo-protein, *e.g.*, liver or kidney—were injected into an animal, the serum of that animal developed a cytolysin which was highly specific for the tissue injected). 2,000 cases of hyperthyroidism have been treated with this serum.—L. i./13.590

TABLE OF INFECTIOUS DISEASES.

DISEASE.	INCUBATION.	QUARANTINE.	ISOLATION OF THE INFECTED.
Varicella (Chickenpox)	11 to 19 days.	20 days.	Until every scab has fallen off particular attention being paid to the scalp. *See* also Therap. Ind.
Diphtheria.	2 to 10 days.	→	When a bacteriological examination of the throat and nasal mucus has been carried out with negative results on three successive occasions at intervals of two days—no antiseptic applications having been made to the throat and nose for at least three hours before taking the swab (*Quarantine*). In no case for less than four weeks, and until convalescence is completed, so that there is no longer any sore throat, or any abnormal discharge from the throat, nose, ears, or eyes, no cutaneous pustulation and no albuminuria and that at least two successive bacteriological examinations of the pharyngeal and nasal mucus for the specific bacillus, made at intervals of not less than 2 days have been negative; each examination having been made not less than three hours after the discontinuance of local applications (*Isolation*).
Influenza	41 to 45 hours.*	——	
Rubella (German Measles)	9 to 18 days.	20 days.	For not less than seven days from the date of the appearance of the rash provided there is no persistence of nasal or other symptoms.
Epidemic Roseola.	9 to 18 days.	20 ,,	Evidence strongly against the conveyance of infection by the air.—F. H. Thornton L. i./16,342.
Morbilli (Measles).	10 to 14 days.	16 ,,	For not less than two weeks from the date of the appearance of the rash, convalescence being satisfactorily established. Revision of Notification. Regulations as at January 1/16. The head of the family and the medical practitioner to notify. The former requirement is a dead letter.—B.M.J. i./16,205.
Mumps.	14 to 23 days.	24 ,,	For not less than two weeks from the commencement—provided that one clear week has elapsed since the complete subsidence of all swelling.
Scarlatina (Scarlet Fever)	2 to 5 days.	10 ,,	For not less than four weeks from the date of the appearance of the rash, provided convalescence is completed, and there is no sore throat, discharge from the ear or nose, suppurating or recently enlarged glands, or eczematous patches.
Variola (Smallpox).	10 to 14 days.	16 ,,	Until every scab has fallen off, and the skin lesions have all healed.
Typhoid Fever	7 to 21 dys.	23 ,	——
Typhus.	5 to 14 dys.	14 ,,	4 weeks.
Whooping Cough.	7 to 19 days.	21 ,,	Until the characteristic spasmodic cough and the whooping have ceased for at least two weeks, or in cases of persistent whooping in not less than six weeks from the commencement of the spasmodic cough.
Ringworm.	—	——	When the whole scalp, having been examined, not one broken off hair showing any of the forms of ringworm fungus is to be detected on microscopic examination.

Based on *Rules for prevention of Infectious Diseases in Schools*—Medical Officers' of Schools Association.—Seventh Edn.—Churchill, 1915. * See B.M.J. ii./18,488.

ANALYSIS OF PRESCRIPTIONS.

The late W. Martindale published an analysis of 12,000 prescriptions in 1894. The following giving the frequency per 1000 of some of the most popular Medicamenta compared with a recent resumé is of interest.

	12,000 prescriptions from Aberdeen, Bournemouth, Carlisle, Cork, Oxford & London. W. Martindale, 1894.	2,000 London prescriptions. W. Martindale, 1894.	1,000 London prescriptions compiled by B. Cockburn, *P.J.* i./13,290.
Spiritus Chloroformi	93·1	91·0	113
Sodii Bicarbonas	67·3	69·5	97
Tinct. Nucis Vom.	82·6	73·0	91
Aq. Chloroformi	36·5	86·5	90
Spirit Ammon. Aromat	56·3	58·0	75
Glycerin	72·9	65·0	68
Aqua Menth. Pip.	31·0	17·5	60
Liq. Strych. Hydrochlor	31·0	34·0	56
Syrup Aurant	66·3	64·5	48
Sod. Salicyl	27·0	19·0	37
Liq. Arsenicalis	29·3	24·0	36
Potass. Bicarb	38·6	28·0	36
Potass. Bromid.	30·4	29·0	34
Ammon. Carb.	33·1	37·5	33
Potass. Iodid	29·7	24·5	31
Tinct. Card. Co.	25·4	30·5	31
Quin. Sulph.	49·8	39·5	28
Tinct. Aurant.	16·2	25·5	26
Mag. Sulph.	21·9	22·5	26
Syr. Tolu	26·0	19·0	25
Acid Boric	32·5	39·0	24
Tinct. Camph. Co.	26·3	18·5	24
Inf. Gent. Co.	19·6	21·5	23
Pot. Cit.	12·6	25·0	22
Ext. Bellad	25·1 (virid)	34·0 (virid)	21
Exs. Nucis Vom.	24·7	30·0	21
Aq. Rosæ	13·8	18·0	18
Acid Carbolic	12·0	10·5	17
Acid Hydrochlor	11·5 (dil.)	9·5 (dil.)	17
Mucilago	16·0	12·5	17

—W. H. M., P.J. i./13,354

A LIST OF THE MOST POTENT ANTISEPTICS.

In Vol. II. we provide details of a large number of experiments (extended over some years) on this subject; below we give an abbreviated list from our investigations of the most Potent Antiseptics. All the following we know to have recognised activity against disease organisms. As a criterion for this we have determined *that in the strengths stated the following Antiseptics will kill B. Coli Communis in 2½ minutes under laboratory conditions.*

Antiseptic.	*Strength.*
Acetanilide	0·25%
Acidum Benzoicum	0·2%
Acidum Carbolicum	1·1%†
Acidum Chromicum	2½%
Acidum Cresylicum	0·5%
Acidum Formicum (actual)	5%
Acidum Lacticum	1%
Acidum Oxalicum	0·5%
Acidum Picricum	0·25%
Acidum Salicylicum	0·1%
Acidum Sulphuricum	0·5%
Alcohol	70%
Argenti Nitras	1 in 2,000
Bromum	1 in 8,000
Chlorinum	1 in 75,000
Creosotum	1 in 300
Formaldehydum	2% (=5% Formalin)
Hydrargyri Cyanidum	1 in 2,500
Hydrargyri Iodidum Rubrum in the form of Mercury Potassium Iodide	1 in 100,000
Hydrargyri Perchloridum	1 in 100,000
Hydrargyri et Zinci Cyanidum (as paste)	
Iodum	1 in 50,000
Liquor Cresolis Saponatus	0·5%
'Phenoloid' Disinfectant	1 in 700
Potassii Permanganas	1 in 2,000
Saccharin Insolubile	0·25%
Sal Alembroth	1 in 90,000
Thorii Nitras	1%
Thymol	1 in 1,500

† 1% hardly kills *B. Coli*, but 1 in 80 almost invariably does so after 2½ minutes contact.

In addition to Vol. II. the chapters on **Acidum Cresylicum** and **Olea Essentialia** should also be consulted for further information.

POISONS.

The pharmacist has frequently to supply poisons and 'poisonous' substances—the latter being differentiated in their legal significance *c.f.*p. 946,—without a medical man's prescription. In view of the exacting nature of the **Poisons and Pharmacy Act, 1908** (8 Edw. 7, ch. 55), which came into force April 1, 1909, it is of importance to be able to determine the position of any poison in the Schedule thereto, which is in two parts. We provide the Schedule below and some further details of the Act. As in past Editions we continue to indicate throughout our pages the part of the Schedule in which each poison falls and on this occasion we indicate Part I. Poisons by means of the sign $\boxed{\text{P1}}$—previously $\textcircled{\mathfrak{P}}$ whilst retaining Ⓟ for Part II. These signs precede the names of every poison in the book,—once as a general rule under its main heading. We would emphasise one or two points out of many which occurred to us during this work of subdivision. Under the 1908 Act a member of the public could not obtain $^{1}/_{100}$ grain of Cocaine Hydrochloride as such without the stringent $\boxed{\text{P1}}$ formalities, but he could legally acquire *any quantity* of Cocaine Hydrochloride in just under 1% solution under Ⓟ conditions as pointed out in our last edition.

The **Cocaine and Opium Proclamation, 1916**, which we deal with on page 949, wisely superimposes Regulations on dealings in Cocaine, the word Cocaine now to include admixtures containing 0·1% or more of it.

In spite of these useful amendments and following on the recent misuses of Cocaine we would again point out that the equally dangerous **Cocaine Substitutes** remain completely *unrestricted.*

These drugs frequently find mention in the columns of the daily press. We see nothing to prevent an enlightened public from embarking on malpractices with these substances. **Cocaine Substitutes** could very easily and usefully have been included in the 1916 prohibitions. Again, Mercuric Chloride cannot be bought by the public except under $\boxed{\text{P1}}$ restrictions, but any quantity of aqueous solution (an ounce will dissolve in a pint) can be legally obtained as a Ⓟ poison. With regard to the "Preparation or admixture containing" clause in Part II. we cannot refrain from pointing out that if one lays stress on the word "containing" as a legal confrère would do, it virtually annuls Part I. To distinguish, say, between a preparation of Atropine and a preparation (of several medicines) to which a small proportion of Atropine is added, we find it to be inoperable,—we fail to see where one class begins and the other ends. In our pages, therefore, a simple preparation of, or a compound mixture containing a salt of Atropine is $\boxed{\text{P1}}$. We adhere strictly to the wording of the Schedule. We have known it claimed on the strength of this clause that a preparation "containing" Antimony, Arsenic* and Picrotoxin is a Part II. poison! Needless to say, though the legal restrictions may be insufficient, pharmacists are fully alive to the necessity of guarding against misuse of dangerous drugs. In distinguishing between poisonous and non-poisonous alkaloids we took the dose in each case into consideration; there were exceedingly few which could be said to be in any way on the borderland between poison and non-poison.

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* A case was contended on this basis and lost.—*c.f.*, p. 172.

The Army Council Order under the Defence of the Realm Act generally known as the **Narcotic Drugs Order**, an abstract of which we also provide, followed closely upon the Cocaine and Opium Proclamation and the two combined created no little bewilderment to the pharmacist. It is earnestly hoped that this latter enactment may be regarded as merely a war measure and be rescinded as quickly as possible as unnecessarily harassing to those engaged in the supply of medicines.

References.

Regulations made under Section 2 of the Poisons and Pharmacy Act, 1908, for the Sale of Poisonous Substances for use exclusively in Agriculture or in Horticulture—from the London Gazette, April 2, 1909, dealing with the granting of licences under this section, duration, renewal, etc., of such licences, keeping, inspection and copying of registers of licencees, keeping, transporting, and selling of the substances in question. Forms of Licence and Renewal Forms, P.J. i./09,501. Editorials on the Subject, P.J. i./09,113,385,489. C.D. i./09,558.

Poisons and Pharmacy (Ireland) Regulations, 1909, *i.e.*, Irish Regulations under Section 2 of the Poisons and Pharmacy Act—*vide* C.D. ii./09,1762 Provisional Rules.—C.D. i./09, p. 520.

Problems of the Poisons Schedule. Suggested that any *poisonous alkaloid* or derivative shall be one for which the max. adult dose does not exceed 2 grains. A *derivative* may be any substance which may be prepared from another, *e.g.*, by substitution or oxidation without altering molecular structure of the parent body. Various definitions for an alkaloid.—Gadd, P.J. ii./09,154. C.D. ii./09,223.

It is to be hoped that the local authorities who will license persons other than legally qualified chemists, to sell "poisonous substances used exclusively in agriculture or horticulture," will realise the seriousness of the new duty entrusted to them. Facilities are, that is to say, granted for more easily obtaining arsenic and nicotine. Safeguards are provided in connexion with mineral acids and soluble salts of oxalic acid—to be labelled "Poisonous." A useful summary of the 'Titles' question. Since 1880 over 1,000 companies had been formed carrying on the business of Chemists and Druggists—many of them by persons who had failed to qualify. According to the new Act a body corporate, or in Scotland a firm or partnership, may carry on the business of Chemist and Druggist if the business is under the control of a superintendent who is duly qualified. Certificate of qualification of bona fide superintendent must be exhibited in the shop. In future the word Pharmacist can be used by Chemists and Druggists but not by companies.—L. i./09,849,937.

British and Continental control of the sale of Potent Drugs compared. Some remarks are made as to the obtaining by the public of Tincture of Opium, Chloral Hydrate and Sulphonal, which hardly do justice to the pharmacist's acknowledged caution in the vending of these preparations—the retail sale of which, as such, at the worst, is very limited indeed.—L. ii./12,1672.

SCHEDULE OF POISONS.

APPLICABLE TO GREAT BRITAIN.

(*Within the Meaning of the Poisons and Pharmacy Act*, 1908.)

PART I. (marked P1 in our text.)

Not to be sold by retail unless the purchaser is known to, or introduced by some person known to, the seller who must be a registered Chemist and Druggist or registered medical practitioner; also *before delivery of the poison* entry to be made in poison-book of (1) date of sale, (2) name and address of purchaser, (3) name and quantity of article, (4) purpose for which it is wanted—attested by signature of buyer; and must be labelled with (1) name of article, (2) the word "Poison," (3) name and address of seller.

Arsenic, and its medicinal preparations. (See also Arsenic Act.)

Aconite, Aconitine and their preparations.

Alkaloids.—All poisonous vegetable alkaloids not specifically named in this schedule and their salts, and all poisonous derivatives of vegetable alkaloids.

Atropine, and its salts, and their preparations.

Belladonna, and all preparations or admixtures (except belladonna plasters), containing 0·1 or more per cent. of belladonna alkaloids.

Cantharides and its poisonous derivatives.

Coca, any preparation or admixture of, containing 1 or more per cent. of coca alkaloids.

Corrosive Sublimate.

Cyanide of Potassium and all poisonous cyanides and their preparations.

Diethyl-Barbituric Acid and other alkyl, aryl, or metallic derivatives of Barbituric Acid, whether described as Veronal, Proponal, Medinal, or by any other trade name, mark, or designation, and all poisonous **Urethanes** and **Ureides***

Emetic Tartar, and all preparations or admixtures containing 1 or more per cent. of Emetic Tartar.

Ergot of Rye and preparations of ergots.

Lead, in combination with Oleic Acid, or other higher fatty acids, whether sold as Diachylon or under any other designation (*except* Machine-made Plasters). ***(Added May 27th, 1917).***

Nux Vomica, and all preparations or admixtures containing 0·2 or more per cent. of strychnine.

Opium, and all preparations or admixtures, containing 0·75 or more per cent. of morphine. ***N.B.***—**TINCTURA OPII (LAUDANUM)** on Dec. 31/14, and after. (Further alteration, March 12/1916),

Picrotoxin.

Prussic Acid and all preparations or admixtures containing 0·1 or more per cent. of Prussic Acid.

Savin and its oil, and all preparations or admixtures containing Savin or its oil.

PART II. (marked Ⓟ in our text.)

Must be labelled with (1) name of article, (2) the word "Poison," (3) name and address of seller who must be a registered Chemist and Druggist.

Almonds, Essential Oil of (unless deprived of prussic acid).

Antimonial Wine.

Cantharides, tincture and all vesicating liquid preparations or admixtures of.

Carbolic Acid, and liquid preparations of, and its homologues containing more than 3% of those substances, *except* preparations for use as sheep-wash, or for any other purpose in connection with agriculture or horticulture contained in a closed vessel distinctly labelled with the word "Poisonous," the name and address of the seller, and a notice of the agricultural or horticultural purposes for which the preparations are intended. (For recent Order in Council *re* Liquid preparations containing not more than 3% of Phenols, see page 946.)

Chloral Hydrate.

Chloroform and all preparations or admixtures containing more than 20% of chloroform.

☞* These were additions to Part II. by the Privy Council, March 12, 1913, see London Gazette, March 14, 1913; P.J. i./13,132,404. ***Transferred to Part I., January 14, 1918.***

Coca, any preparation or admixture of, containing more than 0·1% but less than 1% of coca alkaloids.

Digitalis.

Mercuric Iodide.

Mercuric Sulpho-cyanide.

Oxalic Acid.

Poppies, all preparations of, excepting red poppy petals and syrup of red poppies (*Papaver rhœas*).

Precipitate, Red, and all oxides of Mercury

Precipitate, White.

Strophanthus.

Sulphonal and its homologues, whether described as Trional, Tetronal, or by any other trade mark, name, or designation.*

All preparations or admixtures *which are not included in Part I. of this Schedule, and contain a poison within the meaning of the Pharmacy Acts,* except preparations or admixtures the exclusion of which from this schedule is indicated by the words therein relating to carbolic acid, chloroform, and coca, and except such substances as come within the provisions of Section 5 of this Act.

Note.—The last paragraph in the Schedule brings into Part II. many preparations and admixtures not defined in the Schedule—in particular preparations and admixtures of vegetable drugs containing poisonous vegetable alkaloids should be borne in mind even though the drugs themselves are not in the Schedule. All such preparations are clearly indicated in our pages with the letter Ⓟ. *Reference should be made to the body of the book in cases of doubt.*

ORDERS IN COUNCIL.

In addition to the word **'Poisonous'** *subsequent to Oct.* 1, 1911.—*Regulations by Order in H.M. Privy Council required that the label on any substance to which* **Section 5 of the 1908 Act** *applies (Hydrochloric, Nitric and Sulphuric Acids, Soluble Salts of Oxalic Acid, Liquid Preparations containing more than* 5% *by weight of free Ammonia, and all Liquid Preparations sold as Carbolic, Carbolic Acid, Carbolic Substitutes, or Carbolic Disinfectant, containing not more than* 3% *of Phenols), shall bear distinctly printed thereon* **"not to be taken,"** *and the name and address of the seller. Further any Liquid substance to which the section applies shall not be delivered or sent out except in bottles (etc.) distinguishable by touch. For each of these Poisonous substances see* pp. 47, 73, 74, 97, 141, 13, and 32 *et seq.*

By Order in H.M. Privy Council (Oct. 11*th,* 1912), *it was prescribed that from May* 1, 1913, *all liquid preparations sold as Carbolic, or Carbolic Acid or Carbolic substitutes, or Carbolic Disinfectant containing* **not more than 3% of Phenols,** *shall be substances to which Section* 5 *of the* 1908 *Act applies.—London Gazette, Oct.* 18, 1912.

(*Prior to this Order liquid preparations containing not more than* 3% *of Phenols were outside the provisions of the* 1908 *Act.*)

The wording of the Order it will be observed specifies 'Phenols' whereas the wording in the Schedule of Poisons (Part II.) is CARBOLIC ACID *and its* HOMOLOGUES. *Enquiry officially showed that this*

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* Additions approved by the Privy Council, March 12, 1913, see London Gazette, March 14, 1913; P.J. i./13,132,404.

wording is intended to apply also to **Phenoloids** *where the word 'phenols' is used.*—C.D. ii./12,751.

By Order in Council of March 24th, 1911, *as regards Great Britain, and of August 12th,* 1912, *as regards Ireland* **all retail vendors** *of the substances mentioned in* **Section 2,** *Sheep dips, etc., containing* **Arsenic, Tobacco or Alkaloids of Tobacco,** *must observe the following regulations :—* **Agricultural and Horticultural Poisons**—(1) *In the sale by retail of any substance to which Section* 5 *of the Poisons and Pharmacy Acts* 1908, *applies the label required by the said section to be affixed to the box, bottle, vessel, wrapper, or container in which the substance is contained shall bear distinctly printed thereon the additional words "Not to be taken."*

(2) *In the sale by retail of any liquid substance to which Section* 5 *applies, such substance shall not be delivered or sent out except in bottles or other containers rendered distinguishable by touch from ordinary bottles or containers.—C.D. Diary,* 1914, 473.

No Ferrocyanide or Sulphocyanide excepting Mercuric Sulphocyanide is a poison under the Act.—P.J. ii./07,640.

Regulations for the Keeping, Dispensing, and Selling of Poisons in Great Britain.

(*Prescribed by the Pharmaceutical Society with consent of the Privy Council.*)

1. That in the keeping of poison each bottle, vessel, box, or package containing a poison be labelled with the name of the article, and also with some distinctive mark indicating that it contains poison.

2. Also that in the keeping of poisons each poison be kept on *one or other* of the following systems, viz. :—

(*a*) In a bottle or vessel tied over, capped, locked, or otherwise secured in a manner different from that in which bottles or vessels containing ordinary articles are secured in the same warehouse, shop or dispensary ; or

(*b*) In a bottle or vessel rendered distinguishable by touch from the bottles or vessels in which ordinary articles are kept in the same warehouse, shop, or dispensary ; or

(*c*) In a bottle, vessel, box, or package kept in a room or cupboard set apart for dangerous articles.

3.—That in the dispensing and selling of poisons all liniments, embrocations, lotions, and liquid disinfectants containing poison be sent out in bottles rendered distinguishable by touch from ordinary medicine bottles, and that there also be affixed to each bottle (in addition to the name of the article and to any particular instructions for its use) a label giving notice that the contents of the bottle are not to be taken internally.

WHOLESALE TRADING.

Wholesale trading is exempt from the provisions of Sections I.—XV. of the Pharmacy Act, 1868. **Wholesale dealing includes sales to retailers, medical men, and others who use poisons in their profession or business.**

Attention is specially drawn to Section 17 *of the Act* :—

> "*It shall be unlawful to sell any poison* **either by wholesale or retail** *unless the box (etc.) is labelled with the name of the article and the word Poison and name and address of Seller . . . but the provisions of this Section shall not apply to Sales* **by wholesale dealers to retail dealers** *in the ordinary course of wholesale dealing.*"

P1 POISONS THROUGH THE POST.

Medical men and pharmacists are specially warned that this is illegal. The requirements of Section XVII. of the 1868 Act (which are not altered in any way by the 1908 Act) must be rigidly adhered to.

It is obvious for example that a medical man ordering Morphine to be forwarded through the post **cannot sign the Poison Book.**

The only legal exception that can be made is that the provisions of the section are **not applicable to any article forming part of the ingredients of any medicine dispensed by a registered chemist and druggist.** The **ingredients** of the exempted medicine must be entered in the **prescription book** together with the name of the patient or purchaser.

Even this does not cover the requirement of a medical man desiring a supply of Morphine for use to his patients, but we have been officially informed that this contingency may be ***left to the discretion of the pharmacist,*** In preference the medical man should obtain his supplies locally and sign for them.

To telegraph for supplies of these poisons is inconsiderate and causes the pharmacist grave misgivings.

The Section of the Act was specially framed to safeguard misuse. A case in which Morphine Sulphate was supplied to a member of the public through the post and comments.—P.J. i./17,409,416.

The Sale of Arsenic.

(Applicable to Great Britain and Ireland.)

On every sale of Arsenic, in addition to the requirements of the Poisons and Pharmacy Act, 1908, the following provisions of the Arsenic Act (1851) are to be observed. Particulars of sale to be entered in a book by the seller as follows:—

Date of Sale.	Name and Surname of Purchaser.	Purchaser's place of abode.	Condition or Occupation.	Quantity of Arsenic sold.	Purpose for which required.

(Purchaser's signature.) (Witness.) (Seller's Signature.)

Or if purchaser cannot write, seller to put the words "cannot write."

No person shall sell Arsenic to any person who is unknown to the person selling such Arsenic, unless the sale be made in the presence of a witness who is known to the person selling the Arsenic, and to whom the purchaser is known, and who signs his name, together with his address, to such entries before the delivery of the Arsenic to the purchaser and no person shall sell Arsenic to anyone under full age.

The Arsenic if colourless must be coloured with at least $\frac{1}{16}$ of its weight of Indigo or Soot, unless sold in a quantity of not less than 10 lbs. and for a purpose (*not* for use in agriculture) for which such admixture would render it unfit.

The penalty for offending against the Act is a fine of not exceeding £20.

The Act is not to prevent sale of Arsenic in medicine under a prescription of a legally qualified medical practitioner.

"Arsenic" includes Arsenious and Arsenic Compounds, and all other colurless preparations of same.

Applicable to Ireland.

[*In accordance with the Sale of Poisons* (*Ireland*) *Act*, 1870, *and additions since the passing of the Act.*]

Sales may only be made by registered druggists (all registered under the Pharmacy Act (Ireland) 1875, and the Amendment Act (1890) and by persons qualified under the Poisons and Pharmacy Act, the conditions of sale being similar.

PART I.

Aconite and its preparations.
Alkaloids, all poisonous vegetable alkaloids and their salts.
Arsenic and its preparations.
Cantharides.
Corrosive Sublimate.
Cyanides of Potassium and all metallic cyanides.
Emetic Tartar.
Ergot of Rye and its preparations

Prussic Acid.
Savin and its oil.
Strychnine and its salts.

PART II.

Almonds, Essential Oil of, unless deprived of its prussic acid.
Ammoniated Mercury.
Belladonna and its preparations.
Cantharides, the tincture and all vesicating liquid preparations of
Chloral Hydrate and all its preparations.
Chloroform.
Corrosive Sublimate, Preparations of.
Diethylbarbituric Acid and other alkyl, aryl, or metallic derivatives of barbituric acid, whether described as Veronal, Proponal, Medinal or by any other trade name, mark or designation; and all poisonous urethanes and ureides.
Ether, Sulphuric.
Mercury, Red Oxide of.
Mercury, Biniodide of.
Morphine, Preparations of.
Nux Vomica and its preparations.
Opium and all preparations of opium or poppies.
Oxalic Acid and all oxalates.
Phenol, commonly called carbolic acid.
Phosphorus and all preparations containing it in a free state.
Strychnine, Preparations of.
Every Compound containing any of the poisons mentioned in this Schedule when prepared or sold for the destruction of vermin.

As regards the sale of Agricultural and Horticultural Poisons and Soluble Oxalates—*vide* Arsenic, p. 172, *vide* also Acid Hydrochloric, p. 47, Acid Nitric, p. 73, Acid Sulphuric, p. 97, Acid Oxalic, p. 74, and Ammonia, p. 141, *vide* also Orders in Council, p. 946, 947.

COCAINE AND OPIUM.

Prohibition of Import, Proclamation by His Majesty the King, July 28th, 1916. *With amendments.* (Defence of the Realm Regulations):—

NOTE.—*The following is a summary only. Some slight alterations in the order of the paragraphs have been made since compilation.*

As from this date, subject as hereinafter provided, all cocaine and all opium shall be prohibited to be imported into the United Kingdom: Provided always and it is hereby declared, that nothing in this Proclamation shall apply to cocaine or opium imported under the licence of one of Our Principal Secretaries of State and in accordance with the provisions of such licence.

The ***word "cocaine"*** includes all ***preparations, salts, derivatives, or admixtures prepared therefrom or therewith containing 0·1 per cent.*** or more of the drug; or any solid or liquid extract of the coca leaf containing 0·1% or more of the drug.

The ***word "opium"*** means ***raw opium,*** powdered or granulated opium, or opium prepared for smoking, and includes any solid or semi-solid mixture containing opium.

REGULATION 40 B.

(1) If any person sells, gives, procures, or supplies, or offers to sell, give, procure, or supply cocaine to or for any person, ***other than an authorised person,*** in the United Kingdom, he shall be guilty of a summary offence against these regulations ***unless*** he proves that the ***following conditions*** have been complied with:

(*a*) The cocaine must be supplied on and in accordance with a ***written prescription of a*** duly qualified ***medical practitioner*** and ***dispensed by a person legally authorised*** to dispense such prescription;

(*b*) the ***prescription must be dated*** and ***signed*** by the medical practitioner with his ***full name and address and qualifications, and marked*** with the words ***"Not to be repeated,"*** and must specify the ***total amount of cocaine to be supplied*** on the prescription except that, where the medicine to be supplied on the prescription is a proprietary medicine, it shall be sufficient to state the amount of the medicine to be supplied, and that in the case of prescriptions issued for **National Health Insurance** purposes on the form provided by the Insurance Committee the medical practitioner's address and qualifications and the words "Not to be repeated" need not be marked on the prescription.

(*c*) cocaine shall **not be supplied more than once on the same prescription.**

(*d*) the prescription shall be marked with the **date** on which it is **dispensed** and shall (unless issued for National Health Insurance purposes on the form provided by the Insurance Committee) be **retained** by the person, firm, or body corporate by whom the prescription is dispensed, and shall be **kept on the premises** where it is dispensed, and shall be open to inspection by any person authorised for the purpose by a Secretary of State;

(*e*) the **ingredients of the prescription** so dispensed, with the name and address of the person to whom it is sold or delivered, shall be **entered in a book** specially set apart for this sole purpose and kept on the premises where the prescription is dispensed, which book shall be open to inspection by any person authorised for the purpose by the Secretary of State.

(2) If any person, other than an authorised person or a person licensed to import cocaine, has in his possession any cocaine he shall be guilty of a summary offence against these regulations unless he proves that the cocaine was supplied on and in accordance with such a prescription as aforesaid.

(3) If any person sells, gives, procures, or supplies, or offers to sell, give, procure, or supply, **opium** to or for any person, **other than an authorised person,** in the United Kingdom, or if any person, not being an authorised person or a person licensed to import opium, has any opium in his possession, he shall be guilty of a summary offence against these regulations.

(4) If any person prepares opium for smoking, or deals in or has in his possession any opium so prepared he shall be guilty of a summary offence against these regulations.

(5) **Every person who deals in cocaine or opium shall keep a record** in such form as may be prescribed by a Secretary of State, of all dealings in cocaine or opium effected by him (including sales to persons outside the United Kingdom), and if he fails to do so he shall be guilty of a summary offence against these regulations; every such record shall be open to inspection by any person authorised for the purpose by a Secretary of State.

(6) If any person holding a general or special permit from a Secretary of State to purchase any drug to which this regulation applies fails to comply with any of the conditions subject to which the permit is granted he shall be guilty of a summary offence against these regulations.

(7) For the purpose of this regulation—

The expression **"authorised person"** means a **duly qualified medical practitioner, a registered dentist,** a **registered veterinary surgeon,** a **person, firm, or body corporate** entitled to **carry on the business of a chemist and druggist** under the provisions of the Pharmacy Act, 1868, as amended by the Poisons and Pharmacy Act, 1908, or of the Pharmacy Act (Ireland), 1875, as amended by the Pharmacy Act, Ireland (1875), Amendment Act, 1890, a licentiate of the Apothecaries' Hall in Ireland, **or a person holding a general or special permit from the Secretary of State to purchase the drug in question.**

It is also required that no entry shall be cancelled, obliterated or altered nor be untrue in any particular.

A prescription must be copied in the Prescription Book.

We print the portions of especial interest to medical practitioners and pharmacists in **bold type.**

Alkaloidal Oil of Cocaine sold irregularly, also a 2% solution of Atropine and Cocaine resulted in serious fine of a Chemist.—B.M.J. ii./17,606.

These regulations were made in consequence of representations by the Commissioners of Police at the prompting of the General Officer commanding the London District as to prevalence of the use of Cocaine by soldiers in the London area.—B.M.J. i./17,367.

Natural Coca Leaf.—The regulations do not apply—official from Home Office. C.D., Aug. 19/16.

A very useful commentary on the Regulation appeared in the C.D., January 12/18.

For further references see P.J. ii./16,132; L. ii./16,1024.

Powdered Opium (which is only seldom prescribed by itself medicinally) ***cannot be supplied even on a medical prescription*** unless the person for whom it is prescribed happens to be an authorised person. Pulvis Opii Comp. and Pulv. Ipecac. Comp. are not interfered with. Medical men dispensing their own medicines even gratuitously must observe the same rules as a pharmacist.—B.M.J. ii./16,229,265.

Duly **qualified medical practitioners** are "authorised persons" and are therefore entitled to purchase and be in possession of ***Cocaine*** but they ***may not prescribe or supply it*** to other persons except in accord with the conditions laid down—a written prescription must be made out, etc. It is understood, however, that these requirements do not apply to cocaine personally administered by a medical man. Nor to ordinary medicinal preparations of opium.—B.M.J. ii./17,658.

Wholesalers and others who purchase from importers and resell to chemists must obtain the ***general*** or special ***permit*** mentioned. The wholesaler with this permit is not enabled to sell to ***anyone except the "authorised persons" specified in the Regulation.*** The Chemist and Druggist can only sell in the manner prescribed by a medical practitioner.—C.D., Aug. 5/16.

The Home Secretary prescribed that the record of dealings in Cocaine or Opium required by the above Regulation (40B (1) (e)) shall be in accord with the following:—

Schedule.

Date of Sale.	Name of Person, Body, or Firm to whom Sold.	Address of Person, Body, or Firm to whom Sold.	Authority of Person, Body or Firm to Purchase (*i.e.*, whether Duly Qualified Medical Practitioner, etc., or with Permit of Secretary of State. If Permit give date).	Amount of Opium (or Cocaine) Sold.	Form in which Sold	(For Cocaine only). When Sale is on a Prescription specify the Ingredients of the Prescription.

GENERAL PERMIT as to Cocaine preparations for **First Aid** in **Factories.**

Any occupier of a ***factory*** or workshop to which the Factory and Workshop Act 1901 applies, may by general permit purchase ***for first aid purposes*** to the eye in cases of injury, a preparation of Cocaine base in Castor Oil with Mercuric Chloride in a proportion of not more than 0·5% Cocaine and not less than 1 of Mercuric Chloride in 3000. See page 320.

THE DANGEROUS DRUGS BILL.

Introduced into the House of Commons May 4/20 is to give effect to the Opium Convention signed at the Hague 1912 and by the Treaty of Versailles. It is a continuation of the 1916 Proclamation and the Order in Council of 1917 and of the 40B Regulation.—P.J. i/20,468; C.D. May 15/20, p. 650.

COCAINE IN DENTISTRY.

Following on the Defence of the Realm Regulations regarding the use of Cocaine, representations were made to the Home Office in the middle of 1916 on behalf of unregistered Dentists who would be deprived of powers to employ a solution of Cocaine for dental extraction. It was claimed that supplies of synthetic local anæsthetics (Novocain, etc.) were not available. The Home Secretary temporarily gave sanction to permit unregistered dentists *bona fide* engaged on July 28th, 1916, in practising dentistry to obtain Cocaine preparations for the purpose—not exceeding 1% strength.

The permission was extended first to September 15/16, and then to October of the same year and then to April 30th, 1917.—P.J. i./17,206, and it is still in force.

Entry must be made in the Cocaine Sales Register and in the fourth column should be stated "Unregistered Dentist with Home Secretary's permission August 1916." In the fifth column the *total* amount of Cocaine supplied must be stated. The total amount of Cocaine in the bottle must also be stated on the label.

A Departmental Committee appointed by Mr. Herbert Samuel, November, 1916, recommended:—

"(*a*) That preparations of cocaine containing more than 1 per cent. of cocaine for use as local anæsthetics in connection with dental work should be procurable only from registered chemists, or from persons or firms licensed for the purpose by the Home Secretary, and subject to the condition that such preparations should be used for dental purposes only.

(*b*) That such preparations should only be procurable for use by registered dentists or members of a Dental Association the conditions of membership of which have been approved by the Home Secretary. The above-mentioned classes will naturally be free to purchase all preparations not exceeding 1 per cent. strength.

(*c*) That persons practising *bona fide* as unregistered dental practitioners, and who can so satisfy their local authority, should be entitled to apply for registration, for right to purchase preparations of cocaine containing not more than 1 per cent. of cocaine. Such authorisation to be granted by the County or Borough Council of the locality in which their business is situated, any refusal to register such persons being subject to an appeal to the Home Secretary.'

The Committee concludes as follows:—

"While there is practically no evidence to show any prevalence of the cocaine-habit amongst the people of this country, and only one case of the improper used of cocaine by unregistered dentists, yet, as a drug, it is so uncertain and so potentially dangerous in its uncertainty that some restriction should be placed on its possession and sale."

The Committee found in fact that the incidence of the vice was confined to a small section of the Dominion troops and an almost negligible number of broken down medical men.

Prof. Bayliss expressed the opinion that the use of cocaine is not necessary for any dental operations, and that its place can be taken by novocain. He considers that cocaine is undoubtedly dangerous to many persons, and he is averse to the use of these local anæsthetics being entrusted to any but registered dentists. He stated:—

"Since the sale of cocaine is attended with serious risks to the community and is unnecessary in dentistry, there is no reason to interfere with the operation of Regulation 40B of the Defence of the Realm Regulations, and I would venture to recommend that the permit which has been issued to unregistered dentists to obtain preparations of cocaine should not be continued for any further period of time."

His opinion was further that the complicated machinery devised (granting of permits as above) would be likely to leave undesirable loopholes. B.M.J. ii./17,367 supports the view that there is no adequate reason for relaxation of the regulations.

The Report discusses the advantages and disadvantages of the many Cocaine substitutes and mentions that Novocain has no effect on the brain; it produces local anæsthesia in a time which has been variously stated as from 2 to 10 minutes. It has no toxic effect but must be used with Adrenalin. The latter does not keep good and is apt to produce sloughing unless used in a proportion much lower than that in most preparations available until recently

It is not quite so effective an anæsthetic for pulp operations as Cocaine. For further details see P.J.i./17,206,233 and C.D. Aug. 12,16, March 10 and 17,'17.

The Report of the Dentists' Act Committee—"A Committee to enquire into the extent and gravity of the evils of Dental Practice by persons not qualified under the Dentists Act."—has been issued and is obtainable from the Stationery Office. (6d.) The Committee would make it illegal for unregistered persons to perform dental operations or to fit artificial teeth—the exception being that the person applying for dental aid suffers from toothache and that there is no dentist or medical practitioner within a reasonable distance. Statements by witnesses and recommendations. The increase in numbers of the least reputable section of Unregistered Dental Practice is a menace to public health.—C.D. '19,192,229,247,279.

NARCOTIC DRUGS ORDER

Regulating the sale of Intoxicant or Hypnotic Drugs.

Army Council Order under **Defence** of the **Realm Act,** *re* supply of narcotics to members of **H.M. Forces** (came into force May 11,'16, with amendment of June 5,1918.)

No person shall sell or supply any article specified in the following schedule to orfor **any member of H.M. Forces** (not Registered Medical Practitioners, Registered Dentists or Registered Veterinary Surgeons) unless ordered by a registered medical practitioner or registered dentist or registered veterinary surgeon on or in accord with a written prescription duly dated and signed by the practitioner or dentist or veterinary surgeon with his full name and qualifications and marked with the words "not to be repeated" and specifying the *total* amount of the drug to be supplied on the prescription (except where the medicine to be supplied is a proprietary medicine when "the amount of the medicine to be supplied" is to be stated), and unless the person so selling or supplying shall mark the prescription with his name and address and date on which it is dispensed.

The Chemist must retain the prescription and keep it on the premises so that it can be open to inspection by any person authorised for the purpose by a Secretary of State.

The ingredients with the name and address of the person to whom they are sold or delivered must be entered in a book specially set apart for this sole purpose and kept on the premises where the prescription is dispensed. This book is also to be open for inspection. In the case of a prescription for Cocaine or solid or liquid extract of Coca in a larger quantity than 1 of Cocaine per 1,000, the amount *and* percentage of Cocaine must be plainly marked on the package or bottle. Prescriptions for raw, powdered or granulated Opium *per se* cannot be dispensed.

Schedule.

Barbitone.
Benzamine Lactate.
Benzamine Hydrochloride
Chloral Hydrate.
Coca.
Cocaine.
Codeine.
Diamorphine.
Indian Hemp.
Morphine.
Opium.
Sulphonal and its homologues.

and all other Preparations, Derivatives or Admixtures prepared therefrom or therewith.—P.J.i./16,516 ; B.M.J.ii./17,797.

VENEREAL DISEASE ACT, 1917.

(ABSTRACT.)

An Act to prevent the treatment of Venereal Disease (syphilis, gonorrhœa or soft chancre) otherwise than by **duly qualified medical Practitioners,** and to control the supply of Remedies therefor.

1.—(1) In any area in which this section is in operation, a person shall not, **unless he is a duly qualified medical practitioner** for reward either direct or indirect, **treat any person for venereal disease** or prescribe any remedy therefor, or give any advice in connection with the treatment thereof whether the advice is given to the person to be treated or to any other person.

(2) This section shall operate in any area to which it is applied by order of the Local Government Board, or, in Scotland and Ireland, the Local Government Board for Scotland and Ireland respectively :

Provided that no order shall be made in respect of any area until a scheme for the gratuitous treatment of persons in that area suffering from venereal disease has been approved by the Local Government Board, or, in Scotland and Ireland, the Local Government Board for Scotland and Ireland respectively, and is already in operation.

2.—(1) A person shall not by any advertisement treat or offer to treat any person for venereal disease, or prescribe or offer to prescribe any remedy therefor, or offer to give or give any advice in connection with the treatment thereof.

(2) On and after the first day of November, 1917, a person shall not recommend to the public by any notice or advertisement, or by any label or words written or printed, affixed to or delivered with, any packet, box, bottle, phial, or other inclosure containing the same, any pills, capsules, powders, lozenges, tinctures, potions, cordials, electuaries, plaisters, unguents, salves, ointments, drops, lotions, oils, spirits, medicated herbs and waters, chemical and officinal preparations whatsoever, to be used or applied externally or internally as medicines for the prevention, cure, or relief of any venereal disease:

Provided that nothing in this section shall apply to any advertisement made by any local or public authority or made with the sanction of the Local Government Board, or in Scotland and Ireland the Local Government Board for Scotland and Ireland respectively, or to any publication sent only to duly qualified medical practitioners or to wholesale or retail chemists for the purposes of their business.

3.—Penalties: Imprisonment, with or without hard labour, for not exceeding two years, or on summary conviction to a fine not exceeding one hundred pounds, or to imprisonment, with or without hard labour, for a term not exceeding six months.

National Council for Combating Venereal Disease. Meeting at Edinburgh Resolutions—L. i./19,352.

TRADE-MARKS.

The **1905 Trade Marks Act** defined a Trade Mark as follows:—

"A trade-mark shall mean a mark used, or proposed to be used, upon or in connection with, goods for the purpose of indicating that they are the goods of the proprietor of such trade-mark by virtue of manufacture, selection. certification, dealing with, or offering for sale."

The Trade Mark may be "a device, brand, heading, label, ticket, name, signature, word, letter, numeral, or any combination thereof."

It is important to realise that Trade Marks can exist as **Common Law Trade Marks** but for the purpose of the Merchandise Marks Act a trade mark must be one that is registered.

All trade marks cannot be registered; those accepted by the Registrar of Trade Marks must conform to Section 9 of the Trade Marks Act, 1905, as follows:—

A registrable trade mark must contain or consist of at least one of the following essential particulars:—

(1) The name of a company, individual, or firm represented in a special or particular manner.

(2) The signature of the applicant for registration or some predecessor in his business.

(3) An invented word or invented words.

(4) A word or words having no direct reference to the character or quality of the goods, and not being according to its ordinary signification a geographical name or a surname.

(5) Any other distinctive mark. But a name, signature, or word or words, other than such as fall within the descriptions in the above paragraphs (1), (2), (3), and (4), shall not, except by order of the Board of Trade or the Court, be deemed a distinctive mark.

Trade Marks may be registered in fifty classes, and the legal protection of the Trade Mark is restricted to the class in which it is registered.

The Classes of goods with which the pharmacist is mostly concerned are the following. (We give them in order of frequency):—

III. Chemical substances prepared for use in medicine.

II. Chemical substances used for agricultural, horticultural, veterinary and sanitary purposes.

XLII. Substances used as food or as ingredients in food.

I. Chemical substances used in manufactures, photography, or philosophical research, and anticorrosives.

XLVIII. Perfumery (including toilet articles, preparations for the teeth and hair and perfumed soap.

In the work of revision of this edition we have thought it desirable to continue to indicate Trade Marks by the ∗ preceding the name of the article and on this occasion to *add the numbers* thus T.M. 326021 to each so far as our searches at the Patent Office have indicated.

It is clear that, describing as we do in our pages many and varied articles and having to consult these numerous classes, omissions may have occurred.

Furthermore as the Patent Office Public Index is continually under revision it is quite possible that alterations may have been made subsequent to our searches.

We shall therefore welcome information from owners of Trade Marks concerning corrections which will have consideration in a future edition.

The utility of the numbers is this—that it enables any person by the payment of a small fee at the Patent Office to obtain information as to the status of the Trade Mark in question—date of registration, date of payment of renewal fees, details of assignment, if any, and to ascertain whether the Trade Mark has been avoided or suspended for any reason. This information could not reasonably be incorporated in our pages.

Mr. S. W. Woolley, the Editor of the "Chemist and Druggist" (London), has done excellent service in showing up the anomalous condition of the law in regard to Trade Marks—particularly in respect of

TRADE MARKS FOR PATENTED ARTICLES.

We quote the following from a lecture by him on 'Enemy Patents and Trade Marks' delivered before the Liverpool Chemists' Association, Oct., 1918.

> When an article has been introduced as new and has been first manufactured under a patent, the name by which it is known becomes common property as soon as the expiration of the patent rights puts an end to the monopoly in the manufacture and sale of the article, and although the name may, down to that time have identified the goods with the maker of them, it is no longer available for him as a Trade Mark or Trade Name, *e.g.*, in the following.
>
> "It is impossible to allow a man to prolong his monopoly by trying to turn a description of the article into a Trade Mark. Whatever is mere description is open to all the world."—*James, L.J., in Cheavin* v. *Walker* (1877).
>
> When it is understood that a Trade Mark, by renewal every fourteen years, can be continued indefinitely, and that renewals of the Trade Marks applied to patented articles are made after

the expiry of the patent, the extent of the continuance of the monopoly will be realised.—C.D., January, 30/15.

THE EFFECT OF THE WAR.

On the outbreak of war with Germany it was necessary to take steps to prevent as much as possible the inconvenience which would result from the cessation of the supply of fine chemicals from enemy countries. The **Patents, Designs, and Trade-marks (Temporary Rules) Act,** 1914, (and Amendment Act) gave power to the Board of Trade to make rules or do such things as they thought expedient for avoiding or suspending any patent or granting licences to use patents belonging to enemy proprietors, also to avoid or suspend the registration of enemy Trade Marks. (The Salvarsan Trade Mark is ***suspended*** and the aspirin one ***avoided.*** This official distinction indicates ***temporary user in the former*** case, and the ***opposite in the latter,*** as in the cases of Glycin, Lysol, and Metol.) The rules referred to were afterwards issued according to the Statutory Rules Act, and these govern the proceedings which have since taken place in regard to enemy patents and Trade Marks. The applicant for the suspension of or for a licence to use an enemy patent must show that he ***intends to manufacture the patented article,*** and also show that it is in ***the general interests of the country that such article should be manufactured.*** Similar provisions apply in the case of registered Trade Marks. The Comptroller-General also issued an official notice as to the general principles upon which the Board of Trade deal with applications which come before them. In regard to patents it is stated that licences would, as a general rule, be granted

Where there is no manufacture in this country under the patent and also

Where what manufacture there is is carried on by a company or firm on behalf of alien enemies resident abroad, and there is any reason to doubt that the manufacture will continue to be carried on; or

Where it is in the interests of the country that some other manufacture should be started in the United Kingdom.

In the case of Trade Marks suspension will, as a general rule only be granted

Where the trade-mark is the name of a patented article and a licence is granted under the patent protecting it.

Where it is the only name or only practicable name of an article manufactured under an expired patent.

Where it is the name or the only practicable name of an article manufactured in accordance sith a known process or a formula which has been published or is well known in the trade.

Generally speaking, suspension will not be granted in the case of pictorial devices.

A condition was also announced on May 11, 1917, that *where a licence was granted to employ an enemy patent* the *article manufactured must be called by the name* applied to it by the inventor.

As misapprehension exists as to the ultimate fate of **"avoided" trade marks,** it should be noted that such words **are now public property,** and cannot again become the property of any particular person or persons. The legal sense of "Avoid" is to invalidate or to render a thing of no effect.

Licences to applicants to manufacture under particular patents embody the payment of a royalty after the termination of the war to the present owners of patent rights.

The following are amongst the Trade Marks which have been *avoided* :—Aspirin, Formamint, Glycin, Lysol, Metol, Sanatogen, Urotropin.

The following are *suspended*:—Salvarsan, Neo-Salvarsan, Novocain.

For details the names in question should be consulted in the body of the book.

The following are familiar names which are Registered Trade Marks and which are also subjects of expired British Patents :—

Alumnol.
Aristol.
Benzosol.
Dermatol.
Eucaine.
Euphthalmin.
Euquinine.
Icthyol.
Lanolin.
Proponal.
Protargol.
Pyramidon.
Salophen.
Somatose.
Validol.
Veronal.
Yohimbine.

British makers of Aspirin, Formamint, Glycin, Lysol, Metol, Sanatogen and Urotropin, should use these advertised names as much as possible. The words would never have been avoided if conclusive evidence of their instability as Trade Marks had not been forthcoming. Avoided names are now British names.—Editor, C.D., Oct. 27/1917, p.920.

A correspondent in the C.D. on the subject, however, held the view that the perpetuation of such names as "Aspirin" would not only facilitate the return of the so-called original German products to our markets after the war, but would also make it easy for other enemy firms to introduce competitive products masquerading as British made. Every packet of British Aspirin offered is a reminder that there was once a useful (German) Aspirin and they may desire it again in the erroneous belief that it was better than the British article—though of course the latter is amply pure.

Personally we do not hold this view. British Aspirin of unimpeachable quality has come to stay.—W.H.M.

When these patents expire an apparent but not substantial protection is afforded by the Trade Mark. These Trade Marks very often become almost household words and the Germans have spared no pains to make litigation as costly as possible to maintain their "monopoly." Opportunity should be taken under the Act to remove these Trade Marks.—L. ii./17,684. See also B.M.J. i./15,340.

The C.D. pointed out May26/17, that there was marked indifference on the part of the British manufacturers to the opportunity which existed of releasing well known names of many chemicals from the control of the then enemy manufacturers. An Association of Manufacturers could tackle the subject for the general good.

The same paper, January 27/17, printed a list of ninety-nine familiar names of chemical products, monopolies in respect to each of which had been granted by *letters patent since expired* but which had been *further protected by registration of Trade Marks* for the articles, thereby endeavouring to continue the monopolies. It was suggested that they should be avoided or suspended by order of the President of the Board of Trade as was done in the case of Sanatogen and Formalin.

Subsequently (Feb. 3/17) one reads that the Germans developed into a fine art the practice of applying registered Trade Marks to patented chemicals which latter must expire and their selling names with them. Our laws do not specifically provide for simultaneous expiry of patent and Trade Mark. The Germans by uniting to defend legal actions are in a position to brief the most distinguished patent counsel and thus pile up costs against any British manufacturer who fights them in the courts. **Peace Legislation should embody the principle that no trade mark descriptive of a patented article should be renewed.**

The Patents & Designs Act, 1919, contains nothing revolutionary but strengthens the provisions for the protection of British Industry in the Act of 1907. The new Act is concerned "for the prevention of abuse of monopoly rights"; if within four years from the date of a Patent, the invention is not worked within the United Kingdom on a commercial scale, or if the demand for the patented article in the United Kingdom is not adequately met and for other reasons, the Comptroller may grant "*licences of right*" (exclusive or non-exclusive) to any applicant on such terms as (the the Comptroller) may decide or may even revoke the patent. Section 11 enacts that the specification for an "invention relating to substances prepared or produced by chemical process or intended for food or medicine" shall not include a claim for the substance itself, except when prepared or produced by the special method or process of manufacture described and claimed (in the specification) or by its previous chemical equivalent. Any applicant is *prima facie* entitled to a licence for a food or medicine *patent.* Registration of assignments, etc., of patents is made compulsory. The term of a patent is to be sixteen years instead of fourteen, and existing patents amd licences are extended for two years accordingly.

The Trade Marks Act, 1919, in force since April 1st, 1920, divides the register of trade marks into two parts; part A is to consist of those marks already registered and those hereafter registered under the previous Acts (which, with some amendments, remain in force), part B is to contain a new class of marks, for any mark which has been in use for two years may be registered, under the new Act, unless deceptive or closely resembling a mark already registered. This is apparently intended to permit the registration of many marks which could not be registered under the previous Acts. Registration in part B will, however, only be *prima facie* evidence of ownership: it will never become conclusive, whereas registration in part A is generally conclusive after 7 years. An important new provision is Section 6:—"Where in the case of an article or substance manufactured under any patent......a word trade mark........ is the name or only practicable name of the article or substance so manufactured, all right to the exclusive use of such trade mark,......shall cease upon the expiration or determination of the patent," &c. There is also a provision against registration of a "word which is the only practicable name or description of any single word chemical element or single chemical compound as distinguished from a mixture." These two provisions are intended to prevent the abuse of the trade mark law mentioned above and in the Preface.

THERAPEUTIC INDEX
OF
DISEASES AND SYMPTOMS.

N.B.—Internal Remedies are in Roman type. Vaccines as a general rule are for hypodermic use. *Remedies for local or external use are in italics in a separate paragraph.*

Where there is only one paragraph the reader should understand the remedies are for internal use unless stated to the contrary.

Some of the Articles **recently added to the work,** to which special attention is directed, are printed in the reverse manner, *i.e.*, Internal Remedies in *italics,* and the ones used externally and locally in Roman letters.

Abortion, Threatened.—Codeina, Hydrastis, Morphina, Opium, *Potassii Chloras*, Quinine, Sumbul, Viburnum prunifolium.

Abscesses, general, to abort.—Aconite, Belladonna, Calcium Sulphide (*e.g. in Stearettes*), Quinine, Veratrum.

Acid Carbolic, Argenti Nitras, B.I.P.P., Colloidal Iodine, Dakin's Solution, Eusol, Hydrogen Peroxide, *Iohydrin*, Staphylococcal Vaccine, *Tincture of Iodine, Unguentum Belladonnæ, Ung. Iodi Intinctum. See also* **Wounds.**

Abscesses, Dental. (*Local use.)—Boric Acid Lotion, Dental Solubes,* Hydrogen Peroxide, Iodates, *Lysoform.*

Copper and Zinc Ionisation.

Abscess Liver, Tropical (Internal).—Arsenicals, *Emetine Injections, Emetine Bismuth Iodide, Ipecacuanha, Vaccine of Organism if isolated, Quinine Injections.*

Acidity of Stomach.—Aqua Calcis, Ammonia preps., *Aperfine*, Belladonna, Bismuth preps., *Biscinoid*, Calcii Carbonas, Carbo Ligni, Cerium Salts, *Cremor Magnesiæ, Glyc. Bismuthi Eff.*, Magnesii Carb. or Oxide, *Oleum "Elliott" Caps.*, Potass. Bicarb., Sodii Bicarb.

An ounce of Almond Oil (*internally*), *q.v., first thing in the morning, repeated before other meals if necessary.*—L. ii./09,1739 ; see also Hyperchlorhydria.

Acidosis (Acid Indigestion) of children. Administer purgative, wash out stomach, then subcutaneous, or better, intravenous infusion of Sodium Bicarbonate Solution, Sodium Lactate or Sodium Citrate *per os.—Glucose Rectal Injection.*

Acidosis in diabetes, starvation, various poisonings, cyclic and periodic vomiting, etc.—Alkalis, Alcohol. See also **Diabetes.**

Acne.—Acid Camphoric, Arsenic, *Calc. Sulphid. Stearettes, Fæxin, Fæxin Extract*, Guaiacol, Hypophosphites, Liquor Auri et Arsenii Bromidi, Liquor Auri et Hydrarg. Bromidi, Ol. Morrhuæ, Phosphorus, Potassii Bromid., Quininæ et Ferri Citras, Sodii Bromid., *Stannoxyl*, Sulphur (and Colloid), *Sulphur Stearettes.*

Acid Carbolic, Acid Lactic, Acid. Nitric. stabs, Anserin Mulls Medictd., Calaminæ Lotio, Glycerinum Kaolin, Aceticum, Hydrarg. Perchlorid. Lotio, Ichthyol, Ichthyol-resorcin and Salicylate, Iodates, Lotio Sulphuris cum Sapone, Quillaia Lotion, Ung. Resorcin Co., Colloidal Metals (Silver, Mercury, Sulphur), 'Cremor Sicc.' preps., Acne Vaccine, also Acne and Staphylococcal Vaccine, Sulphur Colloidal, Stannoxyl, *Sulphur Ung., Sulphur Hypochloritis Ung., Sulphur. Iodid. Ung., Thymol Ung.*, 'X' Rays.

Use plenty of hot water to the face and wash night and morning with soap and spirit and afterwards paint on Calamine Lotion and allow to dry on.—B.M.J. i./17,604.

Acne Rosacea. (*Local use.)—Finsen Light and "X" rays.*

Acromegaly.—*Pituitary Extract, Thyroid Extract* (guardedly), *Potassium Iodide, and a Mercurial Salt* (*value doubtful except where there is a specific taint*);

Headache of, relieved by *Antifebrin, Phenacetin, Exalgin, Migralgin, Phenazone.*

Sweatings of, by *Zinc Oxide, Atropine or Picrotoxin.*—L. i./09,28. *See also* **Elephantiasis**

Actinomycosis.—Potassii Iodid., or Sodii Iodid., Salicylates. Thomassen's Iodide Method, *Actino Vaccine.*

Argent. Colloidale, Iodi Injectio, Sol. Argent. Nit., Injectio 20%, *Cupri Sulphas, 'X' Rays.*

Addison's Disease.—Arsenic, Iron, Phosphorus, and Suprarenal preparations. *Adrenalin hypodermically* may increase blood pressure a little.

Adenoids.—Cod Liver Oil, Iodine, Iron, *Liq. Ferro-Manganes. Pept. cum Hæmoglobin, Liq. Iodo-Ferro-Manganes. Pept.*, Syrup Iodo-Tannicus.

Ammon. Chlor. Snuff, Glycerin, Liquor Ferri Perchlor. Nasal Injection of Tannic Acid, Nebulæ (*q.v.*)., 'X' Rays.

Orris Root Powder and Soap on septum to induce sneezing.

Adhesions, Fibrous, Peritoneal, etc., Injectio Thiosinamin et Phenazoni, Inject. Thiosinamin et., Sod. Salicyl.

Ague.—Acid. Salicylic and Salicin, Ammon. Chlorid., Arsenic, Berberina, Chinolinum, Cinchonidinæ Sulphas, Cinchonina, Digitalis, Eupatorium, Hydrastis, Livingstone Rousers, Methylene Blue, Piperina, Quinidinæ Sulph., Quinine Arrhenalate, Quininæ Sulph. and Hydrobrom., *Tylcalsin, Tyllithin*, Salicylates, Sodii Hyposulph., Warburg's Tincture. *See also* **Malaria.**

Albuminuria.—Acid. Gallic., Amyl Nitris, *Basham's Mixture*, Ferri Cacodylas, Fuchsine, Jaborandi and Pilocarpine, Juniper Oil, Nitroglycerin, Ozonic Ether, Strontii Lactas, and purgatives. *Vinum Diureticum, Viscum.*

Differential Diagnosis, see Vol. II.

Alcoholism.—Ammonium Chloride, Arsenic, Atropina, Auri Chlorid., Capsicum, Chloral Hydras, Cinchona, Digitalis, Hydrastis, Hyoscinæ Hydrobromidum, Hyoscyamus, Lupulin, Mistura Antidipsomanica, *Mist. Belladonnæ Xanthoxyli et Hyoscyami*, Mistura Ferri Aperiens, Mistura Magnes, Sulph. Co., Nux Vomica, Phosphorus, Picrotoxin, *Pilulæ Capsici Co.*, Quinine Preps., Stramonium, Strychnine, Zinc preps., *q.v.*, *Atropine and Strychnine Hypodermically to keep the patient away from drink*; *Apomorphine if mad drunk.*

USEFUL OUTLINE OF TREATMENT.

Calomel at bedtime, 'Salts' or Seidlitz in the morning. Acute gastritis is treated by ½ grain doses of Calomel every half hour for 5 hours followed by 'Salts,' Apomorphine hypodermically for acute alcoholism. Nervous patients receive Bromide well diluted *per os* and Strychnine 1/30 grain *hypodermically every six hours.* Suspend Strychnine after six days and give then ½ ounce every hour of the following mixture :—Tinct. Capsici 1 drachm, Liq. Extract of Quassia and Tinct. Ignatia (or Nux Vomica) equal quantities 1½ drachms, Water to 8 ozs.—A. M. Rosebrugh, B.M.J. i./14,704.

Ammon. Chlor. is an antidote to excess.

The following is a useful 'draught' on the morning after a 'big dinner' :—Sodii Bic., Pot. Brom. *aa.* gr. 20, Tinct. Card. Co., Tinct. Gent. Co., *aa* 1 drachm. Aq. *ad* 1½ ozs. (Calomel 5 grains if bowels not already loose).—C. D.

Alopecia.—Arsenic, Iron, Pilocarpine, Strychnine, *Thyroid Gland (Standardised), Preps., either Tabs. or Liquor.*

Ammon. Liquor, Amyl Nitrite with Pilocarpine Hair Lotion, Burt's Fluid, *Cantharides preps., High Frequency current, Hydrargyri Oleas, Hydrargyri Perchlor.* vel Subchlor, *Lin. Iodi*, Liq. Carbonis Deterg. 20% Lotion *c.* Glyc. 10%, *Lotio Capillaris, Chrysarobin*, Lotio Balsami Peruvian, Lotio Excitans, *Lotio Resorcini*, Lotio Etheris Comp., Baume Fioraventi, Linimentum Hoffmanni, Linimentum Jaborandi, Lotio Resorcin et Ac. Salicyl., Lotio Resorcin, Pilocarpin et Canthar., Unguentum Cadini, Ol. Cadini Aceticum, *Oxygen, Petroleum Spirit*, Spiritus Acid. Lactic, 'X' Rays (small doses).

Alopecia areata and other forms of baldness attributable to circulatory disorders. In all forms of baldness a careful examination of the heart and circulation is desirable. In a large proportion of cases of patchy baldness heart disease was found.—David Walsh, B.M.J. ii./13,1007.

Amenorrhœa.—Actæa and Cimicifugin, Aloes, Apiol, Arnica, *Cantharides*, Caulophyllin, *Corpora Lutea, Dewees's Mixture*, Ergota, *Ergot and Apiol Capsules, Elixir Ergotæ cum Ferro*, Eupatorii Inf., *Ferri, Oleas Caps.*, Gosspyii Rad. Cortex, Guaiacum and Apiol, Iron Salts, Manganesii Oxidum, Nickel Phosphas and Sulphas, Ol. Rutæ, Ol. Pulegii, Pil. Aloes et Myrrh, Potass. Permang., Pulsatilla, Savin, Senecio, *Tanacetum. Thyroid gland (Standardised Liquor and Tablets).*

Amœbiasis.—Ipecacuanha or Emetine Injection or "Stearettes" or Salol-coated pills of Ipecac. or Emetine Bismuth Iodid. See also **Dysentery.**

Anæmia.—Alginoid Iron, *Arsamin*, Arsenic, *Benzole Capsules*, Cacodylates, Calcii et Ferri Glycerophosphas, *Calcii Fluoridum*, Calcii Hypophosph., Calcii Phosph., *Capsulæ Cruoris*, *Cholesterin*, Corpora Lutea, Elix Ferro-Mang. Pept. (excellent for children.—Campbell Williams). *Elix Gent. Acida*, *Elix. Hæmoglobin*, Ferri Bromid., Ferri Perchlorid., Liquor Ferri Hypophosph., Ferri Iodidum, Ferri Oleas Caps., *Ferri Oxalas*, Ferri Perchlorid., *Food Preparations (new, various)*, *Glycerol Glycerophosphatum*, Ferri Phosph., Ferri Sulph., Ferrum Dialysat., Ferrum Redactum, *Glycerol Glycerophosphatum cum Medulla rubra*, Hæmoglobin preps. and Capsule, Ferrocarnis, *Lecithin Elixir and Emulsion*, Liquor Ferri Albuminati, Liquor Ferri Peptonati, Liquor Ferri-Manganesii Peptonat, *Liq. Iodo-Ferro-Manganes. Pept.*, *Liq. Ferro-Manganes. Pept. cum Hæmoglobin*, Magnesii Peroxidum, Maltolivine, Manganese Citrate, Marrubin, *Malted Glycerophosphates*, Mycolysine, Nucleinic Acid, Pavimol, Phosphor., Pil Ferri Carb., Pil., Ferri Sulph., Quinine preps., Quinin et Ferri Chlor., Saccharum, Sirop Neurotonique, Sodii Hypophosphis, Spleen Substance Desicc., *Strychninæ Cacodylas*, *Syr. Iodo-Tannicus*, *Syrupus Tann-Iodo Phosphoratus*, *Syrupus Trium Phosphatum*, Tinctura Ferri Pomata, *Trilactine*, *Vinum Tann-Iodo Phosphoratus.*

Anæmia, Pernicious.—*Benzole Capsules*, Mercury, *e.g.*, as Ung. Hyd. Iod. in conjunction with Arsenic.

It is stated that Iron is an absolute poison—the liver already contains excess to draw upon—but arsenic does good.—B.M.J. i./07,72.

For Blood Counting and Staining see Vol. II.

Assumed protozoal in character, large doses of Quinine, Antimony, Mercury should be tried.—Dixon. Pr. Feb. /09,248.

Salvarsan, has been used but not now advised.

Investigation of cases treated by blood transfusion, splenectomy, elimination of foci of infection and arsenicals. No evidence that any of these prolonged life.—Work in U.S.A.—B.M.J. ii./18,63.

Four gland Tablets used with good effect.—Sir J. Cantlie.

Anæsthetics by inhalation.—A.C.E., Æther (*and with Alcohol and Oxygen, and Gas and Oxygen*), Æthyl Bromid., C.E., Æthyl Chlorid., and with Nitrous Oxide, Æthyl Iodid., Anestile, Chloroform (*and with Oxygen* and Hyoscine-Morphine), Nitrous Oxide, Somnoform. *For a "rough sketch" of Chloroform Administration v.p. 280.*

For description of Vernon-Harcourt Regulator, see p. 279; Shipway's App., p. 280.

For treatment if danger arises with Chloroform, see p. 281; with Ether p. 107, with Ethyl Chloride, p. 113.

Anæsthesia, Spinal, see Cocaine, Kerocain, Stovaine, etc., pp.327, 333, 336.

Anæsthetics Local—*Æther*, *Acid. Carbolic*, Adrenol (throat spray), Adreucaine, *Æthyl Chlorid.*, *Alopon*, Anesthone, Anestiform, *Anestile*, *Apothesine*, *Cocaine* (and Substitutes), Cocaine Ionised, Eudrenine Erythrophlœinæ Hydrochloridum, *Ice*, Kerocain, *Menthol*, *Methyl Chloride*, Papaverine, *Paraldehyde*, (intravenous), Quinine, Quin-Hydrochloro-Carbamid., *Stovaine*, *Tropacocaine Tropacocaine Infiltration and Spinal Injection*, *Scopolamine Morphine Injection*, also Scopolamine—Morphine—Atropine. Magnesium Sulphate Intraspinal Injection. Stovaine with Dextrin (Tyrrell Gray) also with Strychnine (Jonnesco). Subcutine. Aether-Saline intravenously, Aether in Oil *per rectum.*

Potassium Sulphate 0·5% added to local anæsthetics for spinal injection enhances action.

Anal Fissures. (*Local use*).—*Belladonna Ointment*, *Carbolic Acid*, Glycerin Aloes, *Ichthyol*, *Iodoform Suppositories*, Quinine HCl. packing and suppos, *Ung. Conii.*

Analgesics = Anodynes.—Acetanilide, Atropine, Belladonna, Butyl Chloral, Camphor, Cannabis, Chloretone, Cocaine and substitutes, Codeine, Conium, Gelsemium, Hyoscyamus, Hyoscine, Hypnal, Lupulus, Morphine, Opium, Orthoform, Phenacetin, Phenazone.

Anaphrodisiacs.—Bromides, Iodides, Opium, Belladonna, Hyoscyamus, Stramonium, Digitalis, purgatives.—H.W.

Aneurism.—Aconite, Amyl Nitris, Calcii Chlorid., Digitalis, Ergotina, *Iodoprotein Tabs.*, Morphine, Nitroglycerin, Potassii Iodidum, Veratrum. *Gelatin Injection.* Diagnosis.—'X' Rays.

Angina Pectoris.—*Acocanthera (with caution)*, Aconite, Æther, Æthyl Iodid., Alcohol, *Amyl Nitris*, Arsenic, Barium Chloride, Cactus, Chloroform Inhalation Capsules (not with low blood pressure), Digitalis, Digitalin cum Nitroglycerin Tabellæ, Erythrol Nitrate Tabellæ, Hoffmann's Anodyne, Hydrogen Perox., Ibogaine, Isobutyl Nitris, Mannitol Nitrate Tabellæ, Morphinæ inj. hypod., Nitroglycerini Liquor and Tabellæ, *Papaverine*, Phenazone, Sodii Nitris, Sod. Theobromine—Sodium Iodide, *Tab. Sodii Nitritis Comp.*, Theobromine , *Theobromine Aceto-Salicyl*, Theobromine Sodium Salicylate, Trilactine.

The victim of angina pectoris may have a blood pressure considerably above normal. The failure of Nitrites to give relief is of bad omen.—F. de Havilland Hall, B.M.J. ii./19,496.

Angina, Pain of.—Amyl Nitrite. Carbonic Snow.

Ankylostomiasis (caused by Ankylostomum duodenale).—*Eucalyptus Oil*, Filix Mas. Ol. Chenopodii c. Thymol, Pelletierine, Podophyllin, *Tablets Betanaphthol* and *Phenolphthalein*, Terpine, Thymol (not suitable for the old or very young).—L.i/08, 102, *Thymol Carbonate*. See also p. 744.

Quassia is of little use; Ol. Chenopodii (*q.v.*) with Thymol at intervals found best.—Jany. 13/17.

Ankylosis. (*Local use.*)—Chlorine from Sodium Chloride, also other drugs, by ionisation.

Anorexia.—Calumba, Capsicum, Cascarilla, Chimaphila, Chiratta, Cinchona preps., Gentian, Ignatia, Nux Vomica, Quassia, Quinine, Strychnine, *Syr. Kolæ Comp.*

Anthrax.—Acid. Carbolic, Arsenobenzol (?), *Blepharis Capensis*, Calcii Sulphid., *Camphor Injection, Iodi. Tinct. Inject.*, Phosphorus, *Sclavo's Serum.* Aluminii Acetas (fomentations), *Carbolic Acid, Creolin and Cyanide dressings, Iodoform.*

Anthelmintics.—See **Worms.**

Antidotes.—See Chapter ; they are also fully referred to in the text ; see also list of *Emetics* in this Index.

Antipyretics. See **Fever.**

Antiseptics for Hands, Instruments, etc. (See also Chapter on).—Acetone in Alcohol, *Acid. Boric, Carbolic, Alcohol*, Bacterol, *Clove Oil*, Diffusol, *Formalised Gelatin, Hyd. Biniod., Hyd. Perchlor.*, Iodine Tincture (*q.v.*), Izal, Listerine, Lysoform, Ol. Sinapis (much diluted), *O-m-p. Cresol*, Perfumed Formosyls, Phenoloid Disinfectant, Tannin in Alcohol, Thymol Disinfectant.

Antiseptics for Wounds.—*Acid. Boric. Lotio and Ung., Acid. Carbolic, Lotio and Ung., Acid. Salicylic, Lotio and Ung.*, Acriflavine, *Alcohol* 75% (*steriliser of skin*), *Alembroth gauze*, Allantoin, Aluminii Acet. Lotio, Anserin Mulls medicated, *Aristol*, Bacterol, Benzoxydol, *Benzoin Co. Tinct.*, Brilliant Green, *Chartazinc*, Cheatle's Green Spray, Chloramine T., Borsal, *Collodium*, Colloidal Metals, *o-m-p* Cresol, Diffusol, Eupad, Eusol, *Glycerinium Iodoformi, Hydrarg. Biniod., Hydrarg. Perchlor., Lotio, Iodoform, Iodoformi Emuls., Iodoform Wool and Ung., Iodol, Iodine in Spirit, Iodised Carbon, Iodine Colloidal, Izal*, Kelly's Paint (Collod. Benzoin), *Lanolin, Liq. Hydrogen Peroxidi. Listerine, Lysoform, Mercuro-Zinc Cyanide, Perchloride Solubes, Petrolei Cerat.*, Phenol and Camph. combined, *Potass. Permang., Resorcin*, Menciere's Solution, Malachite Green (and with Sublimate), Proflavine, *Salol, Salufer*, see Chapter on Antiseptic Values, Vol. II., and in particular see Chapter on *Wounds* in this Index.

Antiseptics, Intestinal.—Acid. Boric, Acid. Carbolic, *Acid Iodic*, Benzo-, naphthol, *Biscinoid*, Bismuth Salicylate, Bismutose, *Calcii Sulphid. Stearettes*, Ichthyol, Ichthoform, *Ixora*, Koumiss, Mercurials, Myrtillus, Naphthalene, Naphthol, Phenol-Bismuth, Quinine Acetyl-Salicyl, Quinine Salicylate, Salacetol, Salol, Sodii Hyposulphis, Sulphocarbolates, *Trilactine, Trilactine Milk, Trimethol, Tylcalsin*, Tylmarin, *Tylmarin-Quinine, Tylmarin Sodium Tylmarin-Thorium.*

Many of these drugs may be prescribed for local action in Stearettes and Formagules, *q.v.*

Antiseptics for the Mouth. Formalin Tablets (Internal). Hydrogen Peroxide Mouth Washes, *q.v.* Thymaglycin.

Antiseptics, Urinary.—*Acid Iodic* and *Iodates*, Benzoic and Boric Acids, Cysatazol, Salol, Hexamine, Hexamine-Resorcin, Methylene Blue, *Tylmarin*, Uro-hexoids, Vesalvine 'S' and 'B,' see also Cystitis. *Zinc Sulphanilas* (urethral injection).

Antispasmodics.—See **Asthma, Convulsions and Epilepsy.**

Aortic Disease.—Ammon. Carb., Camphor Injection, *Erythrol Nit. Tabellæ*, Ferri Iodid., Ferri Perchlor., Iodides, Nux Vomica, Sodii Salicyl., *Tab. Nitroglycerin et Sodii Iodid. cum Arsen.—See also* **Angina Pectoris.**

Aphonia.—See **Voice, Loss of.**

Aphrodisiacs, see **Debility and Nervous Debility.**

Aphthæ.—Bismuth preparations, Iodine Colloidal, Iodoform, Mineral Acids, Potass. Chloras, Quinine preps., Sodii Chloras, *Sodii Sulphis.* Tab. Formalin to suck.

Acid. Boric, Acid. Sulphuros, Alumen, Borax. and Glyc. of, Dakin's Solution, Formaldehyde Pigment, *Iodol, Lotio Nigra et Glycerini, part. æq., Potass. Permang.; Sodii Chlorinat. Liquor.*

Appendicitis.—Combined use of Belladonna and Salicylates (*see* Tinct. Bellad.).

Purgative *e.g.*, Castor Oil or Calomel 2 gr.; Ice bag, Magnesia, Bismuth Subnitrate; Mercurial Ointment to the flank, Codeine if pain excessive, diet and regulation of bowels.—Robin's treatment. *Glycerin Bellad. and hot fomentation alternately.* Move the bowels not before the 4th or 5th day and not until the 7th if abscess forming, when Calomel and a Saline Aperient should be given if necessary. Saline mixture with Hyoscyamus, on no account Opium.—B.M.J. ii./07,568.

Iodine for skin sterilisation prior to operation.

Appendicitis, Threatened.—Enema Asafœtida Compound

For incipient, *Elixir Agrimoniæ Co., Trilactine.*

Why and how to preserve the appendix.—Keetly, L./09,1.

'Rest, starvation and Morphine' will probably clear up the typical mild case in two or three days.—L. ii./08,1138.

300 cases of appendicitis.—Sir G. T. Beatson, Glas. Med. Jl., Nov., 1912.

Arterial Tension, Raised.—Aconite, Antimonial preparations, Potass. Iodidum, Pulv. Sodii Nitritis Comp., Veratrum Viride.—See also **Arteriosclerosis, Blood Pressure and Vasodilators.**

Arterial Tension, Lowered.—Pituitary Gland Preparations raise tension of the blood vessels.—*See* **Cardiac Tonics.**

Arteriosclerosis.—Adrenalin, *Regenerative Tablets*, Benzoates, *Camphor*, Citrates, Erythrol Nit. Tabellæ, *Iodoprotein, Iodogluten*, Peptone, Sodium Hyposulphite, Sodium and Magnesium Sulphates, *Syrupus Iodo-Tannicus*, Iodolysin (Inj.), Thyroid preps., *Trilactine*; Depressor Agents, *e.g.*, Chloral Hydrate, Hippurates, Potassium Iodide, *Nitroglycerin Tabellæ, Tabellæ Sod. Nitritis Co.* For pre-sclerosis Diuretics, finally Theobromine and Digitalis.

Strophanthus and the Hippurates give good results. Vasodilators should not be used in advanced cases.—L. i./13,1315.

The most useful drugs are Amyl Nitrite, Nitroglycerin, Erythrol Nitrate and Sodium Nitrite.—W. Lyne Blight, L. i./15,1167.

Arthritis—See **Gout and Rheumatism.**

Arthritis Deformans.—Iodine Ionised.

Ascarides.—See **Worms.**

Asthma.—Adrenalin ½ m. subcut., Æthyl Iodid., Amidopyrin, Ammon. Brom., Amyl Nitris, Antimony, Arsenic, *Atropine Valerianate*, Belladonna, Bromides, Caffeine, *Caffeine Tri-Iodide Pil. (Billimoria), Calcii Chlorid* (?) *q.v.*, Cannabis, Chloral Hydras, Chloroform, Coca and Cocaine Salicylas, Codeine, Erythrol Nitras, Euphorbia Peplus, Euphorbia pilulifera, *Ext. Grindel Co.*, Grindelia, Hydrarg. Subchlorid., Hyoscine, Iodinol, Iodoprotein Tabs., Jaborandi, Lobeliæ Tinct. and Tinct. Ætherea, *Mannitol*, Menthol, *Naphthol, Nitroglycerin, Papaverine*, Paraldehyde, *Peptone Injections*, Physostigma. Pilocarpine, Potass. Iodidum, *Rutæ Confectio, Salol*, Sodii Iodid., Sodii Nitris, *Tabs. Sod. Iodid. and Sod. Nit. combined*, Solanine, Stramonium, *Spiritus Grindeliæ Co., Strontii Iodid., Tabellæ Antiasthmaticæ.* An emetic may afford great relief.—B.M.J. i./09,538.

Acid. Sulphuros. Vapor, Adrenalin—as spray and hypodermically—said to arrest paroxysm. Oxygen has been injected.

Vaccine B. Influenza, Pneumo., Strepto., M. Catarrh., or M. Paratetrag. acc. to predominant Organism present, preferably Autogenous.

Ammonii Bromidi Vapor, Arsenical Cigarettes, Chloroform Vapor, Coca or Eucalyptus leaves smoked, Compound Asthma Fluid (as spray), *Cubeb Cigarettes*, Nim smoking (in India), *Ozonic Inhaler, Potass. Nit. fumes, Pulvis Lobeliæ Co., Pryidine, Stramonium* or *Tobacco fumes*, Syr. Pilocarp. et Pot. Brom., *Vapor Coninæ.*

In asthma digestives such as Salol and Naphthol. Calomel surpasses these combined with Acetozone $\frac{1}{12}$ and $\frac{1}{2}$ grain resp. *t.d.* Iodides are specific but action not exactly understood. Arsenic may improve. Lobelia in the form of Ethereal Tincture is almost specific over the paroxysm,—better than Grindelia. Nitroglycerin, Erythrol Nitrate and Sodium Nitrite of immense value during a paroxysm. Cocaine and Adrenalin applied to the sensitive spot far back on the nasal septum often cuts short an attack.—G. A. Gibson. —B.M.J. ii./11,793.

Grindelene does good in severe attacks of asthma. For all chronic conditions nothing so good as a combination of potassium iodide 5 grains, and magnesium sulphate 1 drachm, in 1 ounce of water thrice daily, 2 hours p.c.—E. Jepson, B.M.J. ii./17,650.

Asthma is a toxæmia brought on by overcrowding and the like.—James Adam, B.M.J. i./18,113.

Adrenalin 5 to 10 minims injected three or four times a day good. Begin when the breathing is pretty bad.—B.M.J. i./16,36.

Asphyxiating Gas.—*See* **Antidotes to Poisons** at end.

Aural Discharge.—Hexamine (?), *Potassii Cantharidas* (*q.v.*). Trichloracetic Acid for closing of perforations.

Bacilluria (B. Coli).—*Hexamine and Sod. Phosph. Acid, Vaccine,* Detoxicated and *Sensitised Vaccine.*

Balanitis (*Local use*).—*Lotions of Lead Acetate, Zinc Salts, Silver preparations, Tannin, or Zinc Oxide Powder.*

Basedow's Disease—See **Exophthalmic Goitre.**

Bed Sores. (*Local use.*)—*Acid. Tannic, Alcohol, Allantoin,* Anserine Mulls medicated *Argent. Nit. in Nitrous Ether solution, Glycerin,* Glycerin Aloes, *Iodoform Gossyp. and Ung.*, Iodine Colloidal, *Peruv. Bals.*, Perfumed Formosyls, *Tannin, Iodoform and Starch Powder, Resorcin,* Shpagnum, Symphytum Preps.

Beri-Beri.—Extract. Oryzæ Liq., Rice Bran, *Phaseolus,* Strychnine, For routine treatment *v.* Beri-Beri, Vol. II. *See also* **Accessory Food Factors** in this volume.

Bile, Deficiency of.—Ammon. Chloride, Bismuth and Opium, Chirata, *Colalin,* Hepatic Stimulants and Antiseptics, *e.g. Elix. Gentian Acidum,* Salol, Hydrarg. cum Creta, Pancreatised Milk, Sodii Glycocholas, Sodii Phosph. Efferves., Sodii Sulph. Efferves., Sodii Salicylas. Taraxacum.

Bilharzial Disease.—Antimony Pot. Tart. intravenously, also Antim. Soda Tart., Antim. Ox. Inj., Hydr. Perchlor., Methylene Blue, Thymo-benzene, Wortabel Treatment, *q.v.*

Biliary Concretions.—See Gall Stones.

Biliousness.—Calomel, Chirata, *Colalin, Elixir Gentian Acid.*, Euonymin, Iridin, Leptandrin, Podophyllin, Sanguinarin, Seidlitz Powders, Sodii Phosph. Efferves., Sodii Salicyl, Sodii Sulph. Efferves., Sodio-Magnes. Sulph. Eff., *Taraxacum Cocoa.*

Bites and Stings (Insects,—Mosquitoes, etc). (*Local use.*)—*Ammonia,* Blepharis Capensis, *Cocaine,* Emp. Bellad., *Eucalypt. Ol.* (to ward off), Formalin rubbed in, Hydrogen Peroxide, Lysoform, *Moskitin, Onion Juice, Phenol,* Pulegii Oleum, *Sodii Bicarb., Spiritus Chloroformi, Thymol, Vinegar.* Citronella Oil with Carbolic Acid good in warding off mosquitoes. *See also* **Snake Bites.**

Ol. Betulæ (with Olive Oil) is effectual.—P.J. i./13,862.

Magnesium Sulphate Solution 1 in 20. Rub the skin all over with it to *keep off* insects.—*Ibid.*

Cod Liver Oil has been found to have a specific toxic action on all flies and upon mosquitoes and ticks. It destroys all the flies that it even touches. Sprinkled on the surface of water it is more effective than Petroleum in the destruction of larvæ.—Lang, P.J. i./14,593.

The wasp sting poison besides its toxic effect on the heart diminishes the coagulability of the blood. Calcium lactate in 20 grain doses two-hourly and Cardiac stimulants effective.—P.J. ii./13,559.

Fly Prevention.—The following have been advised for destruction. For **rubbish heaps**, etc., Chloride of Lime, Sulphate of Iron either powdered or in 20% solution, Borax, Colemanite (crude Calcium Borate), Slaked Lime, Potassium Permanganate. For *use indoors,* Formalin, Alcohol and water. As deterrents, Pyrethrum, Paraffin, Cresol, Carbolic Acid. For spraying outside walls or canvas of hospitals, etc., a solution of Sodium Arsenite 1 lb., Honey 2 lbs., Treacle 2 lbs., Water 2 gallons. Use in the evening or early morning. Another formula is Commercial Formalin 1 ounce, water ½ pint, milk ½ pint.—Fly Exhibition, Zoological Gardens, C.D. June 5/1915.

To kill flies a 1% solution of Sodium Salicylate is better than Formalin. Of the latter 1·25 to 2·5% of *Commercial Formalin* is the best strength.—C. D., July 28/17.

The Minnesota Fly Trap is as useful as any. Burning pyrethrum or vaporising Cresol (½ oz. in a moderate sized room) will drive flies away.—B.M.J. i./15, 1006.

Berlece's Solution.—Sodium Arsenite 20 Gm., Treacle 100 Gm., Water 1 litre. Steep grass in this and hang it up.—B.M.J. i./15,1006.

Powdered Heldebore (Veratrum Album and V. Viride) ½ lb. to 10 gallons of water applied at the rate of this amount to 8 bushels of manure is an effective larvicide. Has no injurious effects on the manure or plants.—U.S. Dept. of Agriculture, L. ii./15,559.

Insectifuge.—To prevent flies from settling on man and horses.—Pyridine 1 Thymol ½, Safrol 5, Oil of Birch Tar 5, Sperm Oil to 100.

The Birch Oil and Safrol mask the odour of Pyridine. Does not irritate the skin. A small quantity to be smeared on the temples, behind the ears and on the head or on leather of harness.

Kerosene is also effectual.—J. Hamerton, P.J. ii./15,134.

The following Spray Solution should be useful:—

Naphthalin 10, Phenol 10, Camphor 5, Lemon Oil 5, Thyme Oil 2, Lavender Oil 2, Savin Oil 2, Methylated Spirit to 500.

Aloes is a local sedative as in Friar's Balsam. A saturated solution in Tincture of Tolu is good against insect bites.—F. W. Cock, B.M.J. ii./18,256.

Potassium Cyanide has been used to kill larvæ in pools. *See also* **Malaria** Chapter, Vol. II.

Jelly Fish Stings.—*See* p. 653.

Scorpion Stings.—*See* **Snake Bite Lancets.**

Blackwater Fever.—Cassia Beareana, Eff. Saline, *Intravenously Sodium Chloride, Quinine, Digitalis,* Sternberg's Mixture, *Strychnine,* Cholesterin, Methylene Blue, *v.* Vol. II., special Chapter on the subject.

Bladder.—*See* ***Albuminuria and Cystitis.***

Bleeding of Gums.—*Magnes. Lactas. See also* **Gums Inflamed and Spongy.**

Bleeding, to arrest—*See* **Hæmorrhage** and **Epistaxis.**

Blepharitis.—*See* **Conjunctivitis.**

Blistering Applications.—*Acetum, Collodium, Emplastrum, and Liniment of Cantharides, Capsicum preparations.*

Blood Pressure, to Increase.—Pituitary Extract seems to have effect; next in potency is Caffeine. Calcium Lactate moderately effective and Strychnine disappointing. Digitalis to be reserved for cardiac cases.—L. i./11,663.

Atropine, Camphor, cotarnine, digitoxin, ergotoxine, and strychnine are of no value. Adrenalin is dangerous, and should always be used with caution for this purpose. Physostigmine is effective, but as it gives rise to nausea, vomiting, and faintness, it should not be employed in cases of hypotension. Pituitary extract has no pressor effect.—A. Watson, Pr. Apl. 1915.

Blood Pressure, to Reduce.—

(i.) **Heart Depressants.**—Aconite, Arsenic, Mercury, Potass. Salts, Quinine, Salicylic Acid, Veratrum Viride.

(ii.) **Vasodilators.**—Amyl Nitrite and Nitrites, Arsenic, Mercury, Quinine, Salicylic Acid.—B.M.J. ii./06,1455.—See also **Vaso-dilators** and **Angina.**

(iii.) **Purgatives.**

Blood, to increase coagulability of, see List, p. 248.

Boils and Carbuncles.—Acid. Sulph. Dil., Alkalis, Arsenic, Biscinoid Calcii Lactas, Acid Sulph. Dil., Calx Sulphurata, Ferri Perchlorid., Hypophosphites, *Iodates,* Fæxin, Manganese Colloidal injected, Nuclein, Sulphides Stannoxyl, *Sulphur Stearettes,* Sulphurous Waters, Syr. or Pil. Sulphatum' *Trilactine,* Yeast, Streptococcal or Staphylococcal Vaccine.

Argent. Nit., Belladonnæ Glycerin (as pigment and on poultices), *Carbolated Camphor,* Cataplasm Salicyl. Co., Cremor sicc. preps' Argent Oleas, Bismuth Oleas, Barii Oleas, Eupad, Kepad, Hydrog. Perox., Glyc. Acid. Carbolic, Borated Hydrog., Perox., Iodo-Acetone, Iodine Colloidal, *Linimentum Atropinæ,* Lysoform, Methysal Balm, *Opii. Ext.,* Pot. Permang. Pencils, Sphagnol Stanni Oleas, Thorii Oleat. Ung., Radium.

Potassii Tart. Acid (*q.v.*) has been used locally as a dressing in Carbuncle, —Pres. Jan. 1911, p. 1.

Brain, softening of—Bromides, Digitalis, Diuretics, Hypophosphites, Iron Salts, Morrhuæ Ol., Phosphorus.

Brain. Sudden Cerebral Lesions.—If gouty—*Lithia, Potash with some diuretic, Nitrous Ether and Spirit of Juniper to which some Digitalis* may be added—more if thrombosis is suspected than if hæmorrhage is probable

If thrombosis be present, reduce blood coagulability, *e.g.*, by lemon juice. (*c.f.* p. 248). For hæmorrhage chalk in a little suitable acid, *q.s.* to dissolve, to increase the tendency to clotting. *Calcium Lactate* or *Chloride* best if procurable in time. *Arsenic* hypodermically, *e.g.*, ⅕ gr. *Sodii Arsen.* in a little water.—Gowers, B.M.J. ii./07,3.

Breast Inflammation of.—All Antipyretics.

Belladonnæ Ext. Glycerin. and Linim.

Breath, Fetid.—*Acid. Salicylic, Calcii or Pot. Permang., Camphora,* Cremor Magnesiæ, *Creosoti Vapor, Formosyl Mouth-Wash, Myrrh with Borax Tincture.* Formalin Tablets to suck, *Thymaglycin.*

Bright's Disease.—Alkalis, Auri Chlorid., Cannabis, Digitalis, Diuretin, Elaterium, Hydrastis, Iodo-Caffeine, Iodo-Theobromine, Jaborandi and Pilocarpine, Nitroglycerin, Phenazone, Potass. Iodid., Scoparii Succus, *Vinum Diureticum.*

In Bright's Disease when dyspnœa is found, hot air baths and purgatives are useful. In one group diaphoretics are indicated, in another the withdrawal of fluid from the legs, abdomen and chest is necessary, in another group of cases by means of Digitalis or Ether, by stimulants and by expectorants the symptoms may often be successfully combatted, *according to the cause* which must be determined.—Tirard, Clin. Jl. April 5/11,401.

Diet.—(1) Limitation of amount of fluid to 1¼ litres per diem. (2) Milk Diet 2½ to 3 pints per diem. (3) Lacto-vegetarian diet *e.g.* 2 litres milk, 250 Gm. Rice, 250 Gm. Grapes, 750 Cc. Vals or Vichy Water. (4) Chloride-poor-diet *e.g.* Milk, Cream, Rice and Water. This rapidly incresead Sodium Chloride output in a case of acute nephritis. (5) Nitrogen-poor-diet suited to various forms of acute nephritis.—Pr. Aug./09,155.

Bromidrosis.—Potassium Permanganate Wash. Perfumed Formosyls,

The following method which was described by Thin, B.M.J., Sept., 1880, p. 463, said to be invariably curative.—Thoroughly wash the feet, dry and dust with Boric Acid Powder, then put on a pair of socks which have been steeped in a saturated solution of Boric Acid and dried. Shoes must also be powdered inside with Boric Powder. Each day soak the feet twice for 10 minutes at a time in Boric Acid Solution and continue as above.—Pres., Nov., 1912.

Glycerin well spread over the soles and toes before putting on the socks—repeated as required. Successful. Prevents formation of noxious products. Swab with glucose (*q.v.*).—T. H. C. Benians, L. ii./14,1301.

See also **Perspiration, Offensive.**

Bronchiectasis.—Acid. Sulph. Dil., Creosote Inhaler. See also **Bronchitis.**

Bronchitis, Acute.—Aconite, Æthyl Iodide, Ammon. Acet. Liquor. Antim. Tart., Apocodeinæ Hydrochlorid., *Atropine Methyl Bromide,* Codeine Jelly, Glycaphorm, Hexamine, Ipecacuanha, Ol. Cedri Atlantic, Oxygen, *Papaverine,* Squill preparations, Vesalvine ' S.'

Vapor Benzoin, Camphor or Eucalyptus, Counter Irritation, Ol. Succini.

Ol. Eucalypt. has been injected with Olive Oil.

Bronchitis, Chronic.—*Acid. Nit. dil. and Inhalations,* Allium preps. Ammon. Carb. Ammon. Chlorid., Apomorph. Hydrochl., Benzoates and Benzoin, Tinct., Caffeine Periodide, *Calcii Sulphid., Cyperi Rotuna, Caps. or Mist.,* Cimcifuga, Codeina Cough Jelly, Creosote, Dionin, Eucalyptus Oil, Euphorbia, Grindelia, Heroin, *Iodoprotein Tabs.,* Ipecacuanha, Morphine preps., Morrhuæ Ol., Mutton Bird Oil, Piscidia, *Potass. Cyanidum,* Potass. Iodid., Prunus Virginiana, Pulsatilla, Scilla, Senega, *Inf. Polygalæ Compositum,* Syrup. Picis cum Codeina, Syrupus Picis Liquidæ, Tar, *Terpine Di-iodide* Terebenum purum, Terpin Hydrate, Terpinol. Tolu Balsam, Tylcalsin and Tyllithin. *Vaccine of organism present, e.g , Pneumo* B. Septus, B. Influenza, etc., preferably autogenous.

Antimony and Opium, Tinct. Camph. Co., and with Ipecacuanha. If much bronchial spasm and tough expectoration give decalcifying agents—Potass or Sod. Cit. Later tonics.

Vapores.—Acid. Carbolic., Acid. Sulphuros, Benzoini. Camphoræ. Creosoti, Cyllin, Terebeni, Iodi, Croton Ol. Linim., Iodi Linim., Ethyl Iodide Guaiacol, Nebulæ, *q.v. Oxygen* inhaled.

Bronchial Secretion is increased by:—Alkalis, especially Carbonate and other salts of Ammonium, Antimony Salts, Apomorphine, Benzoin, Camphor, Iodine, Ipecacuanha, Jaborandi, Peru Balsam, Quillaia, Senega, Squills, Sulphur, Tar, Terebene, Tobacco, Tolu Balsam, Turpentine.—H.W.

Broncho-Pneumonia and capillary bronchitis in infants. Mist. Paraldehyde and Potass. Iodid. Whisky in small doses.

Bruises. (*Local use*).—*Arnicæ Tinct.* (*well diluted*), *Calendula, Hamamelis, Hydrastis Tinctura, Lot. Plumbi et Opii, Hazel Foam.*

Bubo. (*Local use.*)—*Chlori Aqua, Hydrarg. Oleat., and cum Morphina, Hydrarg. Ung., Hydrogen Peroxid.*

Burns and Scalds (*Local use.*)—*Acid. Boric Ung., Acid. Picric and Wool, Actol, Airol,* Alcohol, Allantoin in dressing, Anserine Mulls medicated, *Calamin. Lotion,* Calcii Oleas, *Chartazinc, Chloretone* 10% *Ointment, Cocainæ Ceratum.* Cremor Sicc preps., Fæxin poultice, Glycerin as an application (good), Hyd. et Zinc Cyanid. Ung., Mastiche Benzol, *Iodoform, Lanolin, Lini Ol. cum Aqua Calcis, Thymol. Ung., Vaseline, Zinci Oleat. Ung., Zinci Ung., Hazel Foam, Volckmann's Solution,* Zinc Peroxid. Picric Acid strongly recommended. Oils not advised. (Navy).—B.M.J. ii./07,524.

Thorough antiseptic cleansing of the affected part and thereafter dusting with equal parts of Boric Acid and Bismuth Carbonate (not nitrate).—L. i./09,38.

Burns 'X' Ray, see "Radiology."

Burns.—In burns of the first degree wet Picric Acid dressings gave much the best results and in burns of the second degree perfectly satisfactory results. Boric Acid baths gave good results in burns of the second degree and Ichthyol Ointment in burns of the third degree.—L. i./12.110.

Iodised Phenol as a dressing useful for burns.—R. Nairn, L. i./15,465.

Paraffin preparations, *e.g.*, that known as 'No. 7' and the proprietary Ambrine are melted and spray on to act as an impervious protective.

Burns (cordite, etc.) in the Jutland battle treated with an oil consisting of Menthol 2 grains, Eucalyptus Oil 3 minims, Carron Oil to the ounce, *not* as a dressing but as an occasional application with cotton wool. Sponge the part with saline solution to remove pus.—W. M. Ash and C. P. G. Wakely, L. ii./16,56.

Burns with Liquid Phenol.—The following did well:—Sponge with strong washing Soda (*e.g.*, 1 in about 5)—Dilute Sodium Hydrate Solution might be better cover very thickly with Ung. Acid Boric and Ung. Zinc. *p. æq.*, wrap in lint and bandage.—W. H. M.

Calculi, Biliary.—Alkalis, Ox Bile, Oleic Acid, Sodii Benzoas, Sodi Bicarb., Sodii Glycocholas, Sodii Oleas, Soap.

Calculi, Urinary.—Ac. Acetic. Dil. Douche, Alkaline Carbonates, Ammon. Benz. and Phosph., Aqua destillata, Calcis Aqua, Lithium preps., Mineral Acids (for Phosphatic), Pichi, Piperazina, Potass. Citras, Sodii Benz. and Hippuras, Sodii. Phos. Acid, Triticum.

Detection of by 'X' Rays, *q.v.* Examination of *vide* Vol. II. The following draught saved a doctor's life.—Tinct. Hyoscy. ½ drachm, Chlorodyne 20 minims, Liquor Potassæ 25 minims, Aq. Camph. ad 1½ ounces. A jagged calculus was passed.—C.D.

Papaverine Sulphate 5 Cc. of 2% Solution injected through catheter has expelled.

Cancer.—*Alnus Glutinosa, Arsamin,* Arsenic preps., Calx Sulphurata, Chelidonium, Chloral Hydras and Opium preps. (as sedatives), *Cinnamic Aldehyde Caps.,* Condurango, Mist. Terebinth. Chiæ, *Elixir Antimonii Cinnamicum, Ext. Violæ Liq., Liq. Violæ Glucosidi,* Magnesium Carbonate or Chloride large doses, *Sodii Cinnamas, Tylmarin,* Tylmarin-Quinine, Tylmarin-Sodium.

Acetone, Acid, Acetic Glacial, *Acid. Arsenious, Acid. Carbolic. (caustic), Acid. Carbolic. Glycerin, Acid. Chromic.,* Acid. Lactic, *Acid. Nitric Fumans, Acid Sulph. Fumans, Acid. Salicylic. cum Oleo,* Benzole Injection. Choline Borate, *Coley's Fluid,* Colloidal Copper, Colloidal Selenium (?), *Cupri Oleatis Emplastrum, Ovules and Bougies,* Eusol Injected, Fibrocoumarin and Comps., Formalin plugging and injection, *Hydrarg. Nit. Acid., Liq. Hydrog. Perox. (in inoperable uterine), Injectio Antimonii, Inject. Antimonii Cinnamica,* Inj. Bismuth Carb. (see Radiology), Iodic Acid, *Iodinol,* Iodo-Acetone, *Iodoform*

Local application of Arsenic (Treunecek), London Paste, Methyl Violet, Morphine, Morphinæ Oleat., Oxygen injected suggested, Quininæ Hydrochloridi Injectio, Liquor Potassii et Sodii Hypochloritum, Quininæ Salicylas, Radium, Resorcin, Secondary Radiation from Silver, *Sempervivum Tect. Succ.* Sodium Orthocoumarate, *Sodii Phosphas Acid. with Hydrochloric Acid, Symphytum Cataplasm, Tarax. Ext. Liq.,* Thoriac Comps., Thymus Gland, *Thyroidectomy* Ung. Thorii Oleat., Uranium Salts, *e.g.*, Oxide as Dusting Powder, Tylmarin-Thorium, Ung. Antimonii (?), Vaccine M. Neoformans, *Vienna Paste, Viola Odorata, 'X' Rays, Zinci Chlorid, and Pasta,* Zinc Mercury Iontophoresis. Many of these are only palliative.—*c.f.* B.M.J. i./11,1221.

Drage's results and opinions on treatment with Cinnamates, Coumarates, Tylmarin, and Colloidal Copper, *v.* p. 28, *et seq.*, and 354.

Cupri Glycinas, also Copper Alanin, *q.v.*, have been suggested for trial.

As Nuclein is essential for rapid cellular mitosis it is suggested to eliminate it from the food entirely, or to alter its composition by replacing the Nitrogen by Antimony, Arsenic, &c.—B.M.J. ii./07,1206.

Cocaine. Cancer sufferers tolerate large doses—diagnostic? *Vide idem.*

Some factors in the ætiology of oral carcinoma.—Q. Jl. Med., Oct., 1911, p. 15.

Magnesium Salts—deficiency in the blood said to be responsible for—*c.f.* Magnesium Carbonate and Chloride.

Goat serum used in inoperable cancer. The goat is considered by Veterinary Surgeons to be immune to cancer. Six cases. Doses from ½ to 6 ounces—the former intramuscular into the buttocks, the latter intravenously. Pain relieved. Action of Goat Serum is probably by attacking the outskirts of the advancing growths, retarding or preventing their advance into normal tissues. A sufficiency ought to lead to shrivelling up of the tumour.—A. Wilson, B.M.J. i./15,155.

For Diagnosis, *vide* **Cancer**, Vol. II.

Cancrum Oris.—Arsenicals, *e.g.*, Galyl intravenously.

Carbolic Burns. See **Burns**. For poisoning, *vide* p. 14.

Cardiac Dyspnœa. (*Local use.*)—Carbonic Snow.

Cardiac Mitral Stenosis.—Oxygen inhalation. Decalcification of the blood, *vide* p. 252 *Camphor.*

Cardiac Tonics.—*Acocanthera* (with caution), Adonidin, Adonis Vernalis Adrenalin, Barii Chloridum, Caffeina, *Camphor*, Convallaria, *e.g.*, Glyco-gelatin Pastil Dry, Digitalis (Tinct., Tinct. Fol. Recent. and Glycetract), Erythrophlœum, *Hydriodic Acid, Ibogaine,* Nitroglycerin, Oxysparteinæ Hydrochloridum, *Pituitary* (Posterior lobe), *Saccharum*, Scilla, Sparteinæ Sulphas, Strophanthus (*Strophanthin has been used intravenously*), Strychnina, *Thyroid Extract*, Veratrum Viride.

Drugs acting upon the heart directly:—

The force of contraction may be increased by:—Apocynum, Barium Salts, Convallaria, Digitalis, Erythrophlœum, Physostigmine, Sparteine, Squill, Strophanthus, Suprarenal Preps., Veratum. *Rate of the Cardiac beat is increased by*:—Atropine, Caffeine, Cocaine, Hyoscyamine. *Both force and the number of beats are increased by*:—Alcohol, Anæsthetics, Chloroform, Ether, Quinine *The vagus centre is stimulated by*:—Aconite, Alcohol, Apocynum Atropine, Butyl Chloral, Chloral Hydrate, Chloroform, Cocaine, Convallaria, Digitalis, Ether, Hydrastis, Hydrocyanic Acid, Hyoscyamine (early in the inaction), Nicotine, Picrotoxin, Pituitary Extract (posterior part), Squill Staphisagria (Delphinine), Strophanthus, Strychnine, Suprarenal Extract Veratrine.—H. W.

In acute injuries, such as rupture of the aortic valves in pericarditis, Digitalis is of little value. In chronic diseases of the myocardium, of syphylitic etc., origin, it is of secondary importance, and is often contra-indicated. Of greatest value in chronic valvular disease and in heart fatigue after acute disease or strain.—Sir R. Douglas Powell, Pr. May, '14,612.

Cardiac Depressants.—*Both force and the number of beats are decreased by*:—Acetanilide, Aconite, Antimony, Arsenic, Bromides, Chloral Hydrate, Emetine, Hydrocyanic Acid, Lobelia, Phenacetin, Phenazone, Pilocarpine, Veratrine.

The vagus may be depressed by:—Large doses of many of the above drugs and drugs which diminish the blood pressure such as Amyl Nitrite and Cocaine.-H.W.

Caries.—Calcii Chlorid., Calcii Hypophosph., Calcii Phosph., Saccharated Wheat Phosphates, *Calcium Iodate.*

Caries, Dental.—Calcii Sulphidum (for Pyorrhœa).
Arsenical Paste, Dental Solubes, *Lanolin and Cocaine, Lactic Acid Bacilli, Paramonochlorphenol.* Lotio Acidi Citrici et Phenolis, *Salol or Formosyl Mouth Wash, Resina Carbolica. See also* Dentistry, local applications.

Examination of teeth showed that the relative proportion of organic and inorganic constituents bears no relationship to the degree in which teeth are attacked by dental caries,—decay is due to predisposing and exciting causes.—P.R.S.M. Odont. Sect., Mar. 10,72.

Cataract, to prevent Senile.—Iodides, Mercurials, (*Hyd. Cyanid.*), Sarsaparilla; Tonics.—Quinine and Iron, Strychnine.

Catarrh, Bronchial.—*See* **Bronchitis.**

Catarrh, Gastro-intestinal.—Alkalis, Ammonii Chlorid., Aperfine, Bismuth Tart. Solub., *Bisciniod*, Bismuth preps. as Bismuthi Benzoas, *Bismuth Nucleinas*, Oxy-Bromide, Salicylas, Sulpho-Carbolas, Sulpho-Cyanid. Phosphas, Bismutose, Caffeine, Collinsonia Canadensis, Emuls. Psyllii, Eucalyptus Globulus, *Ferri Ammon. Cit. Helba*, Hexamethylenetetramine, Hydrastis, Hydrocyanic Acid, Ispagula, Leptandra, *Mist. Catarrhalis*, Opium, Potassii Bichromas, Potass. Cit., Potassium Iodide, Salines, Salol, *Tylmarin, Trilactine Tablets*, Trilactine Milk and Medicated Milk.

Catarrh, Nasal.—Aconite, Ammon. Chlor., Arsenic, Camphor, *Cinnam Ol*, Cubebs, Erysimum Syr., *Glycaphorm, Kinectine, Magisal, Linctus Pini Terp. et Heroin*, Mist. Anti-catarrhalis, Pilula Atropinæ Quininæ et Arsenici, Quininæ, Tab. Quin. Camph. Morph. et Atrop, *Troch. Camph. Salicyl. Co., Tylcalsin, Tyllithin.*

Acetozone Inhalant, *Acid. Carbolic or Acid Tannic Buginarium*, Adrenalin, *Alum Spray*, Alum Chloras (Mallebrein), *Anti-catarrhal salts*, Argent. Colloidal, *Bismuth. Co. Pulv.*, Borated Hydrog. Perox., *Camphor inhalation, Carbolised Smelling Salts*, Comp. Asthma Fluid, *Dobell's Solution, Ethyl Iodide inhaled, Eucalypti Oleum*, Eusol, Guttæ Chlorof. Menthol Co., *Iodoformi Buginarium*, Liq. Alum. Format., *Menthol Inhalation, Injection, Wool and Snuff, Menthol and Camphor Inhalation, Ozonic Inhaler, Potass. Permang. as Nasal douche (very dilute) and some retained with plugs*, Pyocyanase, *Resorcin as Nebula*, Sod. Desoxycholas, *Sozoiodol, Suprarenal Extract*, Thymaglycin, *Ung. Belladonnæ, Ung. Morphinæ cum Acid Tannic Combined Cold*, Ozœna, and other *Vaccines, e.g.*, of B. Septus, B. Friedlander, Influenza, M. Catarrhalis, Pneumo. M. Paratetragenus, Zinc Ions.

To ward off a cold starting with sore throat, gargle repeatedly with Formosyl gargle diluted with equal volume of warm water.—W. H. M.

Nothing so efficient as a fine spray of Formalin Solution, ¼ to ½% applied *early*.—Tilley.

In the initial stage of a cold Morphine Sulphate ⅛ grain or Dover Powder 10 grains at bedtime with hot gruel. This usually arrests. If the dry initial stage passed and the nasal fluxion thoroughly established a draught containing Opium, Ipecacuanha, Salicin, Ammonium Acetate and Camphor is useful, or substitute Spirits of Nitrous Ether for the Opium.—Yeo.

Catarrh, Uterine.—*Acid. Carbolic. Glycerin., Boracis Glycerin., Camphorated Carbolic Acid, Iodoform Gossyp. and Pessus, Plumbi Subacet. Glycerin.* [illegible], *Ung. Adrenalin*, Ovules (see List), *Zinc. Sulph. Uterine Pencils, and with Alum*, Zinc and other Ions

Catarrh, Vesical.—See **Cystitis.**

Cathartics.—See **Constipation.**

Caustics.—*Copper Salts, Nitric Acid, Potassa Fusa, Silver Salts, Sodium Ethylate, Vienna Paste, Zinc Chloride.*

Cerebro-Spinal Fever.—Antimeningo Serum (New), Lister Inst.—*Antim. Pot. Tart. intrav., Hexamine*, Opium, Phenacetin, Phanazonum, Vaccine Treatment. *Calomel and a counter irritant, e.g., Liq. Iodi or Liq. Epispastic over the cervical spine. Flexner's Serum. See* article in Vaccine Chapter.

Iodine in Glycerin as swabbing, Zinc Sulphate as steam spray, Permanganate Spray (1 in 1,000).

Meningococcus Carriers.—*Acriflavine, Di-Chloramine T., Flavine Spray.*

Cerebro-spinal Fever.—Lumleian Lecture.—Sir H. Rolleston, L. i./19,541, 593, 645.

Persistence of C.S. Fever Carriers.—D. Embleton & G. H. Steven, L. i./19, 788.

Method of determining type of the infecting meningococcus.—A. [illegible] Gordon Bell, L. i./19,887.

Chancres, Soft.—*Arsenobenzol, Bismuth, Benzoate, Hydrarg. Flav. Lotio, Hydrarg. Nig. Lotio. Hydrarg. Subchlor. Hydrog. Perox.*, Iodic Acid, *Iodol, Iodoform Pulv. and Ung.*, Liq. Carb. detergens, *Plumbi Acet. Lotio, Resorcin,* Thymol Iodide.

Chapped Skin.—*Acid. Boric. Ung., Camphor Ball, Ceratum Petrolei, Collodium, Glycerin. cum Aqua Rosæ,* Hazel Foam, *Cucumeris Ung., Lanolin,* Thorii Oleat. Ung., *Ung. Phenoboric, Zinc Cream, Zinc Oleate.*

Chicken Pox, *see* **Varicella.**

Chilblains—Calcii Chloridum, *Calcii Iodidum, Calc. Lactas.*

Acid. Boric. Ung., Acid. Camphoric, Acid. Carb. Ung., Aconit. Linim.. Anserin Mulls Medicated, Balsam Locatelli (even if broken), *Bellad. Lin., and Linim Co.*, Lin. Iodi et Bellad., *Cajuput Ol.*, Calamime Lotion (extra strong), Calcis Chlorinat. Ung., *Capsici. Linim., Collodium Iodi., Eucalypti Ol. Ung, Glycerini Plumbi Subacet. Ung., Hazel Foam Hydrogen Peroxide Solution,* Iodine Colloidal, *Iodi Tinct. Decolor., Iodi Ung., Iodoform Wool and Ung. Oleanodyne,* Pasta Ichthyol et Ol. Tereb., *Plumbi. Subacet. Glycerin, Picric Acid Solution,* Tamus Communis, Thorii Oleat. Ung., *Tinct. Capsici fort.* For Lime Salts, *v.* p. 248.

If unbroken the following may do good:—

(1) Immersion of the parts once or twice a day in warm water, with subsequent—(2) Gentle friction with Camphorated Alcohol. (3) Use of a dusting powder,—Bismuth Salicylate 1 in Starch 10. If the sense of burning and pain is not relieved by these means, occlusive dressings with Zinc Ointment or Lassar's Paste, Ichthyolated if required, may be used.

If broken Hydrogen Peroxide (10 vols.) is one of the best antiseptic lotions.

If there is no suppuration, Carron Oil dressings, or a mixture of Ung. Lanolini Vaselinum Zinci Oxidi containing 0.5% Morphine useful.—Pr. Oct. 1910. p. 560.

Paramonochlorphenol may be applied as a 2, 5 or 10% solution in glycerin or in alcohol, the weaker solutions being used for the less severe forms. Swelling disappears in two or three days after using the application, and the distressing itching is relieved almost at once. Ointment as follows, equally as effective:—Paramonochlorphenol, 1, 2 or 5 parts; Vaseline 50 parts, Lanolin 50 parts.—P.J. ii./14,792.

Calcium Chloride 5 grains and Liq. Calcis Sacch. 1 drachm in milk *t.d.* and Pil. Aloes et ferri 4 grains once daily. Include eggs in the daily diet.—E. B. Hazleton, B.M.J. i./17,212.

Chilblains *unbroken*—paint with *Tinct. Capsici and Lin. Camph. Co.* equal parts. For *broken*—*Unguentum Resinæ* ½ *oz., Unguentum Acidi Carbolici* ½ *oz., Zinc Oxide* 2 drachms, Vaseline to 2 ounces.—T. M. Hovell, B.M.J. ii./19,668.

Chloasma.—*See* **Freckles.**

Chlorosis.—Arsenic, *Arsenic and Iron Injection and Drops,* Ferri Amara Mist., Ferri Aper. Mist., Ferri Bromid., Ferri Carb. Pil. (Blaud), Ferri Carb. Sacch., Ferri Co. Mist., Ferri Dialysat. Liq., Ferri Perchlorid. Tinct., Ferri Sulph. Pil., Hypophosphites, Manganese Citrate, Manganesii Oxidum, Marrubin, Mistura Ferri Arsenicalis, Myrrh et Aloes Pil., Nickel Salts, Peroxides. Phosphorus, Santonin, Sirop Neurotonique, Sodii Persulphas, Tinctura Ferri Pomata, *Trilactine,* Vanadates.

Diminish fluids in the body by Caffeine, Magnes. Sulph., Zinc Sulph, *c.f.*—p. 244.

Suppress menstruation by hot injections or Amyl Nitrite.—*Vide* Amyl Nit. or B.M.J. ii./643.

Cholera.—Adrenalin, Atropine injection, Calc. Permang. (with Hypertonic Saline), Camphora, Carbo Animalis, Chloromorphiæ Liq., Copper Salts, *e.g., Sulphocarb.*, Coto and Cotoin, *Erythrol Nit.*, Helba, Hydrarg. cum Creta, Hydrarg. Subchlorid. cum Opio, *Hydrog. Perox.*, Hypod. injections of Quinine Hydrochlorosulphate and Carbamide, *Mannitol Nit.*, Menthol (for vomiting of), Morphina, *Nitroglycerin,* Ol. Allii Essent., Opium, Paracotoin, Plumbi cum Opio Pil., Resorcin, Salol, Sedeff, *Sulphurous Acid,* Tinctura Capsici or Cayenne in Brandy in emergency. Tinctura Chloroformi Co., Tribromophenol-Bismuth, *Tylmarin.*

Vaso-constrictors, *e.g.*, adrenalin, digitalis and caffeine, must be avoided.

Nitrites, the sheet anchor for this disease, following upon the intravenous injection of hypertonic saline to combat the collapse stage as advocated by Rogers.—G. B. Sarkar, Pr., Nov. 12,697.

Tannin rectal injection, Saline Solution rectal injection, Cholera Vaccine, *c.f.*

Multiple Vaccines, Cholera and Typhoid, also *Tetra, Penta* and *Hexavaccines* of Castellani.

Saline injections in treatment of Cholera.—Maj. S. M. Cox, L. ii./16,3.

Glucose, Subcutaneous and Intravenous Injections.

Cholelithiasis.—*See* **Gall Stones**.

Chordee.—Aconite, Belladonna, Bromides, Camphora, Cannabis, Canthar. Tinct. (one minim hourly), Chloral Hydras, Hyoscine, Hyoscyamine, Morphinæ inj. hypod., Opii Suppos.

Chorea.—Acid Aceto-Salicylic, Acetæa, Adalin, Antimonial preps., Arsenic, all Bromides, Brometone, Cacodylates, Cannabis and Chloral, Calcii Chlorid., *Calcii Phosph.*, Camphor Monobrom., *Chloral Hydras*, Cimicifuga Ext. Liq. Codeine, Conium and Coninæ Hydrobrom., Ferri Bromid., Ergot, Chloretone, (L. ii./08,725.) Ferri Phosph., *Formates. Hyd. Perchlor.*, Gelsemium preps., Iodides, *Iodoprotein*, Mag. Sulph., Morrhuæ Ol., *Nitroglycerin Tabellæ*, Phosphorus, Physostigma and Physostigmine, Salicylic Acid, Sodium Salicylate, Scutellaria, Strychnine, Sirop Neurotonique, Sulphonal, *Tylcalsin, Tyllithin*, Valerianates, Zinci Bromid., Sulphas and Oxidum.

Cicatricial Tissue.—Cicatricine, Iodolysin, Injection Thiosinamin et Sod. Salicyl., Ung. Thiosinamin, et c. Phenazon:

Cirrhosis of Liver.—Ammon. Chlorid., Iodides, Acid Nitro-hydrochloric, Calcii Chlorid., Calcii Lactat., Liver Extract, Sodium Phosphate.

Cold, Common.—See **Catarrh, Nasal**.

Colic, Hepatic and **Renal**.—Opium, Morphine, Belladonna (in large doses), Papaverine (Biliary), Amyl Nitrite, Chloroform, or Ether Inhalation.

Colic, Intestinal.—Æther, Anethi Aqua, Belladonna, Benzyl Benzoate, Calcis Aqua (for infants), Cajaput Ol., Camphora, *Cannabis*, Chloroform, Chloromorphiæ Liq., *Elixir Gentianæ Acidum*, Menth. Pip. Ol., Morphine preps., Opium preps., Tinctura Carminativa, Bromides, Chloral, Hyoscyamus, Peppermint, Ruta. Valerian.

Colitis.—Aperfine, Bismuth Salicylate, Dec Aloes Co., Hydrastis, Ispagula, Ixora, Methylene Blue, Naphthalene, Naphthalene Tetrachloride Psyllium, Salicylates, Salol, Thymaglycin, Trilactine, Vaccinum Myrtillus, *B. Coli Vaccine.*

Saline and Boric Enemata, Copper Sulphate injection, *Oils*, Thymaglycin.

Glucose, Subcutaneous and Intravenous Injection. Zinc and other Ionisation.

Colitis, Mucous.—*Bismuth Sod. Salicyl-Salol Pil.*, Enema Bism. et Sod. Salicyl., Emulsio Paraff. c. Bismuth et c. Pancreatin. Astringents, such as Tannic Acid preparations and Nitrate of Silver, and sedatives, *e.g.*, Bismuth Salts and Petroleum Emulsion. have been widely used. Salol, *B*-naphthol and intestinal antiseptics generally, Colon Lavage, Vaccinium Myrtillus.

Saline Transfusion or Sea Water.

Charcoal, 2 drachm doses 4 times a day after meals. Motions in a fortnight rendered free from mucus and blood. Used in India to ward off dysentery and diarrhœa.—T. B. Broadway, L. i./18,637.

Colitis, Ulcerative.—*Anti-dysenteric Serum*, Bismuth Carb., *Calc. Sulphid. Stearettes, Ipecac.*, *Methylene Blue*, Potass. Permang., *Silver also Copper and Zinc ionised.*

Enema Bismuth. Subgallat., Ol. Morrh. c. Cresot., Emulsio Sulphuris injected through an artificial anus.

Collapse and Fainting.—Æther inj. hypod., Æther Spt., and Spt. Co., Alcohol, Ammon. Arom. Spt., Ammon. Vapor, Amyl Nitris., Brandy Sterules, *Camphor Inject.*, Capsules Aromat, Ammonia, *Curschmann's Solution*, Digitalis Tinct. and Inj. Hypod., 20 m., *Erythrol Nit. Tabs.*, Mannitol Nit. Tabs., Nitroglycerin Tabs., Oxygen, Oxygen and Alcohol, *Regenerative Tablets.* For Rectal Feeding see p. 393.

Colour Blindness.—Calcium Lactate is stated to have benefited.—B.M.J. ii./09,315.

Comedones.—Glycerinum Kaolin Aceticum, Iodates, *Phenol, Calamin Lotion, Calx Sulphurata, Fowler's Solution, Resorcin.*

Conjunctivitis. (*Locally*).—*Acid. Boric, Alumen*, Alum Aceto-Tart., *Argenti Acetas, Argenti Fluoridum*, Argent. Iodid. Recent, *Argenti Nitrase Argenti Oleas, Argyrol, Belladonna, Bismuth Oxyiodogallas* (gonorrhœal), *Boroglyceride, Borax*, Colloidal Silver and Mercury, *Collyrium Adstringens, Luteum*, Cuprung, *Hydrarg. cum. Morphina Oleat, Hydrarg. Oxid. Flav. Ung. Hydrogen Peroxide, Hydroquinone, Opii Vinum, Resorcin, Zinc. Acetat. vel Sulph. Lotio*, Zinc Ions.

Bacteriology of conjunctivitis.—L. ii./11,1418.

Conjunctivitis, Diphtheritic (*Local use*).—*Formaldehyde*, Hydrog-Perox., *Hydroquinone, Iodol, Quininæ HCl. vel Sulph. Lotio., Resorcin*, Methylene Blue.

Constipation.

(1.). ***Laxatives:***—*Agar*, Aloes, Aloin, *Aperfine*, Cascara (Capsules, Elixir, Jelly, Mistura Laxativa, Pastils,) Castor Oil (useful with Glycerin *p. æq.*), Emulsio Paraff. c. Rhamno Frang., *Maricol* or other Castor Oil Powder, Emblic Myrobalans, Elixir and Syrupus Ficorum, *Flax Seed*, Guaiacum and Sulphur Tablets, '*Hindu Dates*,' Hormonal, Levurine, *Maltaffin*, *Maltolivine*, Manna, Mist. Cascara Co., *Mucogene*, Ol. Olivæ, *Oleum 'Elliott' Capsules*, Ol. Ricini Aromat, *Paraffagar*, Paraffinum Liq. and Molle, Pavimol, Eff. and Tablets Phenolphthalein and *Phenolphthalein Co.*, Pil. Cascara Co., Pulv. Glycyrrhizæ Co., Rhamnus Frangula, Rhubarb preps. of, Senna (Elixir, Conf.), *Sodii Hyposulphis*, Sulphuris Conf., Tamar Indien, Tinctura Laxativa, Trilactine Tabs., or Milk.

Phenolphthalein, it is stated, is eliminated entirely per rectum.

Tab. Phenolphthalein with Hyd.c. Creta *aa.* 2 gr. is a useful combination.

A favourite formula—equal parts of Myrrh, Socotrine Aloes, Cassia Pulp made into a 5 grain pill.—L. ii./11,810

(2) (*a*) ***Secretion Stimulants***—Ammonium Chloride, Aqua Aperiens, Jalap and preps., Magnesium Chloride and Citrate, *Marienbad Salt Tablets*, *Normal Saline* (1 pint) *mane sum.* Saline Aperient Waters, Seidlitz Pdrs, *Sodii Chlorid.*, Sodio-Magnes. Sulph. Eff., Sodii Phosph. Eff., Sodii Sulph. Eff. (*b*) ***Hepatic Stimulants***—Aloes, Colocynth and preps., Ipecacuanha, Iridin, Jalap, Mist. Hepatica, Podophyllin, Rhubarb, Sodii Glycocholas, Sodii Sulph., Taraxacum Cocoa, *Elixir Gentianæ Acidum.* (*c*) ***Cholagogues***—Blue Pill, Calomel, Euonymin, Grey Powder, Leptandra, Magnesium Chloride, Pilulæ Laxantes, Scammony (Pil. Conf.), Stillingia, Taraxacum preps.

(3.) ***Peristalsis, Excitants of***—Ignatia, Nux Vomica, Senna, Strychnine, *Pil. Bellad. Nucis Vom. et Cannabis.*

(4.) ***Spasm Relievers.***—Asafœtida, Belladonna, Bromides, Chloral, Hyoscyamus preps., Peppermint, Valerian.

(5.) ***Nerve Tonics***—Arsenical preps., Caffeine, Sodii Glycerophosphas, Zinc Valerianas.

Pil. Hydrarg. Subch. Rhei Cascar, et Capsicin would have combined effect.

Chronic constipation.—B.M.A. Discussion.—L. ii./1910,468.

Constipation may exist with a daily opening of the bowels. Delay in passage of the intestinal contents over the normal 40 hours can easily be shown by giving charcoal biscuits to colour the fæces.

Pituitary Extract has been used to counteract intestinal toxæmia.

Enemata (*vide* p. 393), and *Trilactine, Injection and Suppositories. Fel Bovini, Gauze Tampons coated with Soap are used.*

Hypodermic Purgatives.—Aloin, Apocodeine, Colocynthin, Hormonal, Physostigmine.

Intestinal Paresis.—*Enema Ammoniæ.*

Convulsions.—Amyl Nitris, Anæsthetics, Bromalin, Camphor Monobrom., Chloral, *Chloral and Morphine combined*, Chloroform, Conium, Morphine preps., Moschus, Podophyllin, Potass. Acetas, Potassii Bromid., Rue, enema of—(or infantile), Urea-Bromine, Santonin, Sodii Bromid., Sodii Nitris, *Syr. Pilocarpin et Potass. Brom.*

Chloral and Morphine combined.—Chloral Suppositories

Convulsions, Puerperal.—Amyl Nitrite Capsules, Anæsthetics, Chloral Hydras, Chloroform, Erythrol Nitrate Tabellæ, Morphine, Musk, Nitro-glycerin Tabellæ, *Papaverine*, Pilocarpine, Veratrum Viride, *Thyroid Ext. hypodermically* (*B.M.J.* ii./08,1670), *Sodium Acetate Injections* ½ drachm to the pint (*ibid.*). *Routine Treatment.—Purgatives, e.g.*, Jalap, Mag. Sulph., Calomel and Croton Oil. *Diaphoretics.*—Pilocarpine (of great value). *Nerve Sedatives.*—Bromides, Chloral, Morphine in varied dose.—L. i./11,219.

Adrenalin and Parathyroid, Hirudin, Erythrol Nitrate, Calcium Chloride, Potassium Chloride, Serum Treatment, removal of colostrum, hot packs and hot air bath, Oxygen, the injection of air or Oxygen and Potassium Iodide into the mammæ, and lumbar anæsthesia have also been used. R. A. Gibbons recommends venesection combined with the endeavour to eliminate the poison and dilution with Saline Transfusion.—B.M.J. i./13,865.

Cornea, Inflammation, and Ulcers of. (*Local use.*)—Argent. Iodid.

Rec. *Atropine, Belladonna, Boric Acid Lotion, Cocain. Hydroch. Liquor, Daturine, Duboisine, Eserine, Fluorescein* (*diagnostic*), Iodine Tincture (Cocaine before and after painted on), Scarlet Red, *Hydrarg. Oxid. Flav. Ung*, *Hydrarg. Subchlorid., Infusum Abri, Pilocarpine and Quinine Lotion.*

Corns (*Local use.*)—*Acetic Acid* (*glacial*), *Carbolic Acid, Collodium Callosum, Cupri Oleas, Fowler's Solution of Arsenic, Papaw, Formalin, Lin. Iodi., Ung. Iodi Intinctum, Iodum Oleatum*, Salicylic Ions, Thorii Oleat. Ung.

Corns, Soft (*Local use.*)—Durine, Perfumed Formosyls, *Silver Nitrate Solution 1 in 3 applied every 4 or 5 days.*

Coryza.—*See* **Catarrh, Nasal,** and **Hay Fever.**

Cough.—Acid Hydrobromic, Acid. Hydrocyanic, Belladonna, *Camphor and Creosote inhaled*, Camph. Co. Tinct., Chloral Hydras, Codeina, Conium, *Cynoglossum*, Elixir Pectorale, *Elix. Pini Terpin et Diacetyl-Morph. Gee's Linctus*, Gelsemium, Glycaphorm, Glykeron, Guttæ Rosæ, Helenin, Hyoscyamus, Hypnal, *Lichenoids*, Linctus Camphor. Comp., *Linctus Expectorans* (Antimonii), *Linct. Menthol. Linct Morph. Comp., Linct. Morph. Hydrocyanicus*, Pavimol, Linctus Terp. Heroin Co., *Linct. Thymi et Diaphorm.*, Pastilli Pectorales, Ozonic Inhalers, *Liq. Pectoralis*, Marrubium, *Mist. Apomorph. Co., Mist. Tussi Rub*, Morphinæ Linctus, Morphinæ Troch., Morphinæ et Ipecac. Troch., Opium preps., Pastilli varii. *q.v.*. Picis Liq. Pil., Prunus Virginiana, Rami Syrup, Sandal Wood Oil, Spirit of Chloroform, Syrup Coccillanæ Comp., Syrup. Pini Pumilionis, Syr. Thymi c. Diaphorm, Symphytum Infusion, Tab. Formalin to suck, Tabellæ Glycyrrhizæ, Terpin Hydrate, Terebenum, Terpinol, Troch. Tussis, *Tinct. Benzoin Co., Tylcalsin, Tyllithin*, Vapor Creosot. Co. (Phthisical cough).

Cretinism.—Thyroid Preparations (preferably *standardised* Liquor or Tablets). *'Three Gland' and 'Four Gland' Elixir and Tablets. Suprarenal gland.*

Cyclitis.—Potass. Salicylas.

Cystitis.—*Acid Camphoricum*, Acid Lactic, Aconite, Alkalis, Ammonium Benzoate, Betol, Belladonna, Benzoates, Boric Acid, Buchu, Cannabis Indica, Collinsonia Canadensis, Copaiba, Cystazol, Eucalyptus Globulus, Gokhru, Hexamethylenetetramine and comps., Hydrastis, Juniper, Kava Kava, Liquor Potassæ, *Magnesii Boro-Citras*, Pareira, Pichi, Saccharinum, Salol, Sod. Salicyl, *Sorghum*, Triticum repens, Uva Ursi, Vesalvine 'B' and Vesalvine 'S' *B. Coli Vaccine.*

Argenti Fluoridum, Iodidum and Nitras, B. Ac. Lactic. Irrigation, *Cocaine Lactate*, Colloidal Mercury and Silver, *Creolin Solution*, Iodine Douche, *Formosyl*, Quinine Bisulphate 1 in 2,000, Salicylic Ions, Zinc Sulphanilas.

Cystitis—its Causes and Treatment:—Internal medication in cases of *mild B. Coli infections* in cases of incontinuence or involuntary nocturnal micturition in children and the cystitis commonly occurring during and after pregnancy usually successful if taken in hand early. Drinks containing Acetate and Citrate of Potash: Conf. Senna and Conf. Sulphuris *p. æq.* Phenacetin and Ext. Hyoscyamus in 5 grain doses, and if pain very acute and vesical tenesmus present a rectal injection of 2 drachms of Starch containing Antipyrin and Laudanum may be given. Urinary antiseptics as the inflammation declines.

Locally.—Boric Acid Solution ½ strength most useful if thoroughly done In chronic cases Silver Nitrate 1 to 2 grains per ounce carefully instilled (in a child 3 ounces may be used and left in the bladder). When the vesical end of the mucous membrane of the canal becomes involved the passage to be swabbed out with Liq. Phenol through a speculum and immediately washed with Sodium Bicarbonate Solution to check action of the Phenol.

Acute Cystitis.—Phenacetin and Ext. Hyoscyami 5 grains each *t.d.*. Appropriate Vaccine. Local Treatment.—Instillations, irrigations with Permanganate 1 in 2,000, Protargol, etc.

Chronic Cystitis.—Internally Boric Acid, ditto with Sodium Benzoate, Antiseptic irrigation. Full directions are given for the latter by syphoning.—L. i./12,570.

Cystitis, chronic.—Ammonium Benzoate, Buchu, *Cinnamates*, Eusol as douche, Grindelia, *Hydrog. Perox.* (*5 to 10 vol.*), Juniper, Pareira, Quinine Sulph. Acid douche, Salol, Sandal Wood. *Santalol* (Caps. and Tabs.). See also above.

Croup, False.—*See* **Laryngismus Stridulus.**

Dandruff *see* **Seborrhœa.**

Deafness.—Pilocarpine, Uranium, *e.g.*, Autunite Irradiation, *q.v.* *S also* **Earache.**

Debility.—Alcohol, *Ammon. Picratis Mist.*, *Aperfine*, Arsenic preps., Bone Marrow Extract, Bovril, Calcii Hypophosph. Syrup, Calcii Phosph., *Calc. Glyceroph. c. Lacte Exsicc*, Capsulæ Cruoris, *Capsulæ Valerianat*, *Catha Milk and Glycerophosphates*, *'Bismuth and Pancreatin,' Chondrin*, Cinchona preparations, Conf. Glyceroph. Co., *Coptis Teeta*, Elixir Ferro-Manganes. Pept., Elixir Gentianæ Acidum, *Elix. Hæmoglobin c. Lecithin*, *Emuls. Ol. Morrh. c. Lecithin*, Eupatorium, Ferrocarnis, *Formates (Inorganic and Quinine)*, Glycerophosphates, *Glycerole of Hypophosphites*, Hæmoglobin Capsules and other preps., Herogen, Hypophosphites, Iron Salts, Kreochyle, Kolentos, Lecithin Pulvis, *Liq. Pepsinæ et Caffeinæ*, Maltum, *Malted Glycerophosphates*, Maltolivin, Marrubin, *Malt Ext. c. Hæmoglobin, c. Pancreatin , c. Hypophosph., &c.*, Malt Ext. cum Syr. Ferri. Phosph., Morrhuæ Ol., *Oleum 'Elliott' caps*, *Pavimol*, *Phosphorus*, *Pil. Potentin Co.*, Pil. Lecithin c. Ferri Iodid., *Pulv. Glycerophosph. Co.*, Quassia, Quinine preps., *Sirop Neurotonique*, Sodium Cacodylate, Strychnine, *Salts, e.g., Cacodylate and Formate*, Syrup Ferri Phosphat. cum Quinina et Strychnina, *Syr. Formatum Comp.*, *Syr. Kolæ Comp.*, *Syrupus Glycerophosphatum cum Formatibus*, *Helba*, *Tylmarin*, Trilactine. *See also* **Anæmia.**

Delirium Tremens and *see* **Alcoholism.**—Ammon. Carb., Apomorphina, Auri Chlorid., Bromides, Camphora Monobromata, Capsicum, Chloral, Digitalis, Hyoscine, Hyoscyamine, Opium preps., Phosphorus, Quinine preps., Sodium Chloride Injections, Strychnine, Sulphonal, Urea-Bromine, Valerianates.

Paraldehyde is a safe hypnotic.

Dengue Fever.—Sodium Salicylate. Salicin, Potassium Iodide, Phenacetin and Caffeine.

Dentistry. (*Local use.*)—Adreucaine, Alcohol Sandarachi, *Baldock's Paste*, Borated Hydrogen Peroxide, *Cinnamon Paste*, *Cocaine Lanolin*, Cocaine-Menthol-Phenol, Codrenine, Collutorium Alkalinum Astringens, Formalin, and with Creolin, *Copal Solution*, Dental Anæsthetic, *Dental Compo*, *Dental Rubber*, *Dental Wax*, Emplastrum Capsici, *Eucaine Lactate*, Erythrophleine, *Fletcher's Artificial Dentine*, Gossypium Arseniosum, *Hydrogen Peroxide*, Iodoform Paste, Formosyl Mouth Wash, Tooth Paste, and Dental Dressing, *Mercury Amalgam*, *Pasta Arsenicalis.* Zinc Oxychloride, Zinc Oxyphosphate, Zinc Oxysulphate.

For suspended animation after anæsthetics.—Amyl Nitrite Capsules. *Vide* also Chloroform, &c.

Dercum's Disease.—Thyroid (*q.v.*).

Dermatitis.—(*Locally*) Liq. Alum. Acet., Acid Boric Lotion, Anserine Mulls Medicated, Perfumed Formosyls, Carbolised Zinc Ointment.

Dermatitis 'X Ray' (*Local use.*) Boric Acid Ointment, Radium, Mesothorium Bromide.

Keratosis accompanying.—Carbonic Snow.

Diabetes Insipidus.—Arsenic, Adrenalin, Belladonna, Ergot, Gallic Acid, Lithium Salts, Lithion, Opium, *Rhus Aromatica*.

Pituitary Injection.

Diabetes Mellitus.—Acid Acetyl-Salicylic, Gallic, Acid Lactic, Alkalis, Arsenic Brom., Cacodylates, *Calcii Iodid.*, Codeina, Codeinæ Pill Co., Convallaria, *Cremor Magnesiæ*, Creosotum, *Fæxin Ext.*, *Duodenal Extract*, Eucalypt. Fol. Inf., *Gluten*, Gold Salts, *Glycerin*, Glycerophosphates, *Guaiaci Resina*, Hexamethylenetetramine, Hydrogen Peroxide, Iron Salts, Jaborandi, Jambul, Lævulose, *Lecithin Elixir and Emulsion*, Levurine, Liver Dried, Magnes. Peroxide, *Milk and Glycerophosph.*, Morphina, Nuclein, Opium, Oxygen, Ozonic Ether, Pancreatin, Phosphorus, *Pil. Codein. Valerian Co.*. Potassium Chlorate, Saccharin, Elixir and Tabellæ of, Salol, *Santonin*, *Sedeff*, Sodii Arsenias, Sodium Chloride intravenously, Sodii Citras, Sodii Phosphas, Sodii Salicylas, Suprarenal gland, *Taka-Diastase*, Thymol, Thymus and Thyroid gland, *Trilactine*, Trypsin, Uranii Nitras, Yeast.

Phenazone with Aspirin 5 grains each, reduces night calls to micturition and relieves thirst and burning sensation.—B.M.J. ii./07,1054. *q.v.* for full account of diabetes in the tropics.

Diabetic Foods, see p 576; see also Soya Bean. Dietetic Treatment, see acidosis, Vol. II.

Glycosuria, Lectures by A. E. Garrod.—Lecture I., Historical review of the subject. Diagnosis (glucose and other reducing substances, see Vol. II., Glucose Tests). Classification of various forms of glycosuria, potential or alimentary glycosuria.—L. i./12,483. Lecture II. deals with transient or temporary glycosuria and the share of various organs in the causation.—L. i./12,557. Lecture III.—The association of glycosuria with disorders of the ductless glands. Therapy necessitates knowledge of what lies behind the diabetic syndrome.—L. i./12,629. See also B.M.J. i./11,1416.

Diastase, it has been stated, can benefit A prolonged investigation did not confirm. Q. Jl. Med., Oct. 1912,30.

Atropine combined with Opium, *e.g.*, Belladonna Extract ¼ grain, Opium Extract ½ grain, Logwood Extract a sufficiency to make a pill, has been strongly advocated by Rudisch and others.—Cowrie, Pres., 1912,116.

W. Hale White on Glycosuria. See L. i./14,367.

Lactose (*q.v.*) is stated to be assimilated by diabetics.

Allen's New Dietetic Treatment of. A paper dealing with the metabolic changes produced by the treatment.—P. J. Cammidge, B.M.J. i./17,503. See also O. Leyton, B.M.J. i./17,252; and Modern Views discussed.—E. P. Poulton, L. i./18,863, 895; ii./18,31.

Casein and Cream every 2 hours in small quantities in diabetes with satisfactory results. The results are often very prompt.—R. T. Williamson, B.M.J. i./15,456.

Importance of regulating the fat-intake in diabetes mellitus.—P. J. Cammidge, B.M.J. i./18,393.

Amino-Acids Content, Significance of. *Vide* Amino Acids, Vol. II.

Coma of:—

Alkaline drinks freely as routine treatment, also Sodium Carbonate (not Bicarbonate) 40 Gm. per litre intravenously if coma sets in.—Treatise on.—M.P. Mar. 20, 1902, *p.* 307.

For the **thirst of**:—Pastillus Acidi Citrici c. Limone, Spondias Mongifera.

Purging treatment by natural aperient water, followed by drinking water or thin drinks—said to restore to health and remove all symptoms.—L. i./09,202.

Air-hunger or acidosis may arise when diabetic patients either taking an excess of Carbohydrates or, on the other hand, when the Carbohydrate is too suddenly removed from the dietary. In diabetes where 'air-hunger' develops examine chest for evidence of tubercle or other pulmonary trouble,—this may be present even when, or particularly when, sugar shows signs of decreasing. In marked apathy or drowsiness in either diabetic or non-diabetic patients being fed per rectum, it is a safe rule to give Alkalis and Carbohydrates if Acetone and Diacetic Acid be found in the urine.—N. Tirard. Clin. Jl., Apl. 5,/'11 401.

Exceedingly large doses, *e.g.*, 500 Gm. of 5% Sodium Bicarbonate intravenously.—See L. i./14,403.

Sodium Bicarbonate 40 Gm., Levulose 30 Gm. in water, 1,000 Cc. by drop enema.—L. ii./13,1395.

Potassium Citrate ½ drachm doses hourly, or Sodium Bicarbonate ½ ounce administered in ½ pint of warm water hourly as an enema.—Cowrie, Pres., 1912,116.

Langdon Brown's Mixture for control of acidosis: Sodium Bicarbonate 1 drachm, Potassium Citrate 30 grains, Calcium Lactate 5 grains, Magnesium Carbonate 5 grains, Chloroform Water to 1 ounce.

Diabetic coma. Prevention and treatment.—P. J. Cammidge, L. i./19,60.

Diaphoretics.—

Acting peripherally:—Nicotine, Pilocarpine. *Warmth* (local application) and Alcohol (internally) perhaps act in the same way in addition to their vascular action. *Acting centrally*:—Ammonium Acetate, Ammonium Citrate, Antimony Salts, Ipecacuanha, Opium. *Mode of action doubtful*:—Potassium Acetate, Potassium Citrate,—*and feeble*:—Aconite, Colchicum, Lobelia and Salicin. *Anhidrotics* or *Antihidrotics*,—Acting peripherally,—Atropine by acting on the ends of the nerves in the glands, Agaricin, Hyoscyamine, Stramonium. Cold (local application). Mode of action doubtful.—Acids, Nux Vomica. Picritoxin, Quinine, Zinc Salts.—H. W.

Diarrhœa.—Acid. Camphoric., Acid. Carbolic., Acid. Gallic., Acid. Hydrochloric Dil., Acid. Lactic., Acid. Sulph. Dil. and Aromat., Agaricus albus and Agaricin, *Albumen Water*, *Allmatein*, Anthemidis Tinct., Benzonaphthol, *Benzyl Benzoate*, *Bisciniod*, Bismuthi et Cerii Salicylas, Bismuthi Salicylas, Tannas and other preps., Cajuput Oil, Calcii Carb., Calcii Salicylas, Calcis Aqua, Camphora, Catechu, *Catha Milk and Glyceroph.*, Cinnamon, Cloves, *Conradi's Drops*, Coto, Cotoin, Cretæ Arom. Pulv., and cum Opio, Cupri Sulph., Cupri Sulphocarbol., *Cyllin Syrup*, Eucalyptus Gum, *Liq. Ferri Pernitratis*, Ferri Salicylas Fortoin Guaiacol Carb., Hæmotoxylin, Hydrarg.

Perchlor. in small doses, *Hyd. Subchlor.* (large doses, *q.v.*), Ipecacuanha, Ixora, Mist. Antiseptica, U.C.H., for infants (Mistura Diarrhœa, Board of Health), Naphthalin, Naphthol, Opium preps., Plumbi Acet. Pulv. Ipecac. Co., Pulv. Kino Co., Quercus, Quininæ Salicylas, Resorcin, *Rhus Glabra Ext. Liq.*, Ricini Ol. *and Aromaticum*, *Sedeff*, Salacetol, Salicylic Milk, Sassafras, Sea Water Treatment (Infantile), Sodii Phosphas, Sod. Salicyl., Syr. Aegle Marm. Co., *Thieleman's Mixture*, Tribromophenol-Bismuth, Sodii Sulphas (infantile), *q.v.*, Trilactine Tablets or Milk, *Tyicasin*, *Tyuithin*, *Vin. Coto-Pepsin*, Whey Powder, Zinc Sulpho-carbolate.

Acid. Tannic. Suppos., et cum Opio, *Amyli Enema, et cum Opio*, *Gallæ Suppos. et cum Opio*, *Tannin rectal injection*, *Turpentine Stupes.* See also Dysentery. *infra.*

Diarrhœa, Infantile.—Isotonic Sea Water or Normal Saline Transfusion.

Infantile diarrhœa Treatment.—L. i./11,580.

Diarrhœa of Phthisis.—Coto and drugs as for diarrhœa, *q.v.*

Diphtheria.—Acid. Salicylic., Aconite, Antitoxin (and Vaccine as adjuvant), Calcii Sulphid., *Endotoxin*, Ferri Perchlorid., *Hydrogen Peroxide*, Sodii Benzoas, Sodii Chloras, Sodii Hyposulphis, Strychnine preps. for paralysis when a sequela, Tribromophenol. Normal Saline (in grave toxæmic states).

Acid. Benzoic. Nebula, *Acid. Carbolic. Glycerin, and Nebula*, *Acid. Lactic. Nebula*, *Acid. Sulphuros. Nebula*, Ananassæ Tinct., Argent. Nit. Swab (*v. infra.*), *Chlori Gargarisma*, Colloidal Silver, Mercury, Copper Ionisation (chronic diphtheria of the ear), *Eucalypti Ol. and Vapor*, *Formol Spray*, *Hydrogen Peroxide*, *Hydroquinone*, *Iodic Acid*, Iodised Phenol (Pigment, Gargle and Inhalation), *Iodol Pigment*, *Loeffler's Pigment*, *Menthol Pigment*, *Naphthol cum Camphora*, Nebula Acid Malic, *Ozonic Ether*, *Papayotin*, *Pyocyanase*, *Resorcin*, *Sodii Benzoatis Nebula*, *Sodii Chlorinat. Liquor*, *Toluol.*

Spraying the throat with Hydrarg Perchlor. Solution 1 in 1000 is of extraordinary and life saving value.—L.i./11,494.

For sustaining blood pressure in diphtheria Adrenalin Chloride Solution in small doses at regular intervals (5 to 10 minims every four hours by mouth, or 2 to 3 minims hypodermically every 6 to 8 hours), from the beginning of the case is useful. It is, however, a grave error to give Adrenalin or any like substance towards the end of the case or in large doses irregularly.—J. J. Jervis and V. C. Martyn, Pr. Aug. '14,277. *See also* **Adrenalin.**

Laryngeal diphtheria well treated by 'Ordinary Petroleum Oil.'—B.M.J. i./15,208. *c.f.*p. 629.

Sterilisation of the throat after diphtheria by painting with 12½% Silver Nitrate solution. A second application (25%) may be needed. Of 40 cases 28 were sterilised by one application; 8 cases required two paintings.—W. S. Thacker's Method (B.M.J. i./16,374.).—M. E. Harding, B.M.J. i./18,15.

A serum has been made (Arloing, Lyons) by injecting into the horse the diphtheria toxin and the bacilli together. Tablets for *internal use* or an *insufflation* of this *dried serum* mixed with tragacanth and an inert powder are effective.—K. L. bacilli found to disappear from the throat.—Pr. Feb. 1920.

Diphtheritic Infections of the Skin.—Zinc Ions.

Dipsomania.—*See* **Alcoholism.**

Disinfectants.—See Chapter on.

Diuretics.—*See* **Dropsy Renal.** *See also* Ammon. Acet., Cantharides, Digitalis, Pill. Hydrarg., Theobrom. Sod. Sal.

Dropsy, Cardiac.—Acocanthera (with caution) Adonidin, *Apocynum preps.*, Asparagin, *Baillie's Pill*, Caffeine, Cantharides Tinct., Convallaria majalis, Delphina, Digitalin, Digitalis, Elaterium, Erythrophlœum, Iodo-Caffeine, Pituitary Dry (entire gland), Strophanthus, Theobromine-Aceto-Salicyl, *Theophylline*, Theophylline Sodium Acetate, Veratrum Viride.

Pil. Hydrarg. (avoid if renal disease present).

Tapping and subsequent injection of Adrenalin.—B.M.J. ii./09,537.

Dropsy, Hepatic.—Ammon. Benzoas, Ammon. Chlorid., Copaibæ Bals., Cytisin, Hydrarg. Pil., Hydrarg. Subchlorid., Sodii Bicarb., Sparteinæ Sulphas, Taraxacum.

Dropsy, Renal.—Ammon. Acet., Cit., Tart., Apocynum Cannabinum, Buchu, Caffeina, *Cantharides Tinct.*, Copaiba, Digitalis, Delphina, Elaterium, Erodium Cicutarium, Gin, Hemidesmus, Hydrarg Pil., Hydroxycaffeine, Iodo-Caffeine, Iodo-Theobromine, Jalapa, Pilocarpine, Pineal Body Extract(?), Potass. Acet., Potass. Tart. Acida, Potass. Iodid., Potass. Nit., Scilla, Scoparius, Sodii Iodid., *Theobromine-Aceto-Salicyl*, *Theobromine-Sodium Format.* and Salicyl, Theophylline, *Theophylline Sodium Acet.*, *Urea-Bromine*, *Vinum Diureticum.*

Combine 'watery' aperient, *e.g.*, P. Jalap Co., with diuretics, *e.g.*, Ammon Acet. Cit. *vel* Tart

Pot. Permang. Injection.—*See* Uræmia.

Dupuytren's Contraction.—Chlorine ions from Sodium Chloride, Fibrolysin, Injectio Thiosinamin et Antipyrin (see also Sir J Barr, under Calcii Chlorid). Thyroid Gland and Three and Four Gland Tablets.

Dysentery.—Alum, *Antidysenteric Sera*, Argenti Nitras (Rectal Injection), Belæ Fructus, *Benzyl Benzoate*, Bismuthi et Cerii Salicylas, *Bisciniod*, *Bismuth Tart. Solubile*, Brucea Sem., *Calcii Salicylas*, Calotropis, Cannabis, Cassia Beareana, Calomel, &c. (the evacuant method), *Chaparro Amargosa* (Bitter Bush) for 'carriers,' *Crocq's Pill*, Cupri Sulphocarb., *Cynoglussum*, *Cyper. Caps.*, or *Mist.*, *Dec. Simaruba et Punic Granat*, *Elix. Agrimon Co.*, Emetine Bismuth Iodide, Emetine Injections, Eucalypti Gum., Fæxin, Guarana, Hæmatoxylon, Hamamelis, Helba, Hydrarg. Perchlorid., Hyd. Subchlor. (large doses), *Hydrog. Perox.*, well diluted as enema, *Hysterionica*, *Ipecacuanha* (*e.g.*, in 'Stearettes' or 'Formagules' to avoid vomiting), Holarrhena, Ixora, *Krebisote*, Ipecacuanha sine Emetina, Ipecac. Co. Pulv., *Kosam Seeds*, Magnesium and Sodium Sulphates, *Monsonia Ovata* (said to be specific for Tropical Dysentery, L. ii./o6,1496; see also R. A. J. Asbury, L. ii./15,1318), Naphthalene, Opium, Plumbi Acetas, Salicylic Acid by Rectal Injection, *Sedeff*, Simaruba, Syr. Aegle Marmelos Co., Tannin, *Trilactine*, *Tylcalsin*, *Tyllihin* Terebenum purum, Terebinth, Ol., and Stupes of, Yeast, *Dysentery Vaccine*, *Gibson's Sensitized Dys. Vaccine.*

Sour milk is an excellent dietary. All acute cases receive 2 drachms Magnesium Sulphate every 2 hours until stools become fæculent or until 2 ounces have been given. If this is unsuccessful, *Bismuth Salicylate* and *Salol* 10 grains each thrice daily for 3 or 4 days—reverting to the Magnesium Sulphate treatment subsequently. *Emetine* hypodermically *after* this saline treatment 1 grain morning and evening subcutaneously. Given promiscuously it is harmful.—J. Carey Evans, B.M.J. i./17,418.

Dysentery treated by a combination of drugs. Ipecacuanha Powder 50 grains with 20 to 30 minims of Tincture of Opium every morning with a quinine and carbolic acid mixture. Germicide and tonic.—L. W. Seymour, B.M.J. ii. /17,115.

The chapter on Ipecac. and Emetine should be carefully consulted.

Ether and Caffeine hypodermically for cases of tropical dysentery when patient *in extremis.*

Enemata of Quinine, or Silver Nitrate or Copper Sulphate each 1 in 1000 for chronic cases.—B.M.J. ii./o7,1068.—Sandwith. L. ii./o7,1589.

Amœbic Dysentery and 'Carriers.'—Emetine Injections and Emetine Bismuth Iodide (*vide* Ipecacuanha chapter). Simaruba.

E. Histolytica, Incidence of and other protozoa among healthy entries to the navy.—H. A. Baylis, L. i./19,54.

Bacillary Dysentery.—Emetine, Silver Gelatose (*i.e.*, Albargin), *q.v.* Enema 1 to 1½ pints, strength 1 grain to 1 ounce.—Leonard Rogers.

Symptomatology of the bacillary and amœbic forms of dysentery.—Sir C. P. Lukis, B.M.J i./13,1357. See also further abstract of this and other papers under "Emetine." Consult also large amount of recent knowledge under Dysentery.

Dysentery Vaccine.

Salol-coated Ipecac. Pills in treatment of amœbic dysentery and relapses.—Prof. S. K. Simon, Jl. Am. Med. Ass., per L. i./19,429.

Dysmenorrhœa.—Actæa, Æther Spt. cum Opii. Tinct., Amyl Nitris, Anemonin, Apiol, Belladonna Suppository, *Benzyl Benzoate* (?), Butyl Chloral Camphor, Cannabis and Cannabin Tannas, Cannabis and Chloral, *Castor*, Cimicifugin, *Corpora Lutea*, Elixir Ergotic. Ferro, Gelsemium preps., Gossypi, Rad. Cort., *Liq. Cauloph. et Pulsatilla*, *Guaiacum Resin Cachets, the most* reliable drug.—B.M.J. ii./10,284. *Mist. Dysmenorrhœica*, *Mist. Morphin Phenazon. Co.*, of W. W. W., *Oleum Valerianæ*, *Opium*, *Ovules Morphine, and others*, Piscidia, Potass. Bromid., Pulsatilla, Salix nigra, Saw Palmetto, Serpentaria, Sodii Salicylas, Styptol, Stypticin, Syr. Iodo-Tannicus, *Tab Ergot Senecin Comp.*, Valerian, Viburnum prunifolium.

The following has been found useful:—Potassium Bromide 160 grains Chloral Hydrate 80 grains, Nephenthe 80 minims, Elixir Viburnum Co. 2 ounces, Water to 8 ounces. ½ oz. *t.d.s.p.r.n.ex.aq.*

Dyspepsia.—Acid. Carbolic, Perle and Pil., Acid. Nit. Dil., Acid. Hydroch. Dil., *Alkagen Tabs.*, Aloes and Aloin, Ammon. Carb., Ammon. Chloridum. Aqua Carminativa, Arsenic, Atropine Methyl Bromide, *Bisciniod*, Bismuth. '*Bismuth and Pancreatin*,' Benzoas, Carb., Oleas, Oxy-Bromid., Oxychlorid., *Tart. Solub.*, Subnit., Phosphas, Sulphocarbol., and Sulphis, *Bromoprotein*, Cajuput Ol., Calcii Peroxid., Capsicum, *Capsul. Fe. Glyceroph Co.*, *Capsul. Valerian Co.*, *Catha Milk and Glyceroph.*, Cerii Oxalas, *Charbon Naphtole*, Condurango, *Corchorus Capsularis*, Creosote, Creosoti Valerianas, Diascordium, Digestin, Emblic Myrobalans, *Elixir Gentianæ Acid*, Eupatorium, *Fœxin* (believed to act as direct anti-bacterial agent), Gentiana, Gingerin-Gold Salts, Helba, Hydrarg. cum. Creta, Hydrastis, Hydrocyanic Acid, *Hysterionica*, Invert Sugar, Lecithin Elixir and Emulsion, Leptandra, *Liquor Pepsinæ et Caffeinæ*, *Liq.* and *Tabellæ*, *Papain et Iridin*, Lithia–Bism. Citras, *Liq. Bism. Tart.*, *Magnesia Cream*, *Magnesii Hydroxidum cum Carbone*, *Mist. Carminativ.*, Monsonia, Nux Vomica, *Oleum 'Elliott' caps.*, *Oleum Valerianæ* Pancreatin, Papain Glycerin, Acid., Pavimol, Peptonising Powders, Pepsin, Pepsin and Bismuth Tablets, Podophyllin, Potassii Bichromas, Quassin, Quinine preps., Rhei Rad. Pulv., Rumicin, Sal Polychrestum, Sanguinarin, Sedeff, Serpentary, Sodii Bicarb., Sodii Hyposulphis, Sodii Sulphocarb. Sodii Taurocholas, Sodium Bism. Citras *Sodium Citrate for adding to Milk* *Spirit Meliss, Comp.*, Strontii Bromidum, Strontii Lactas, *Tab. Bismuth Pepsin et Cascara*, Tinct. Bellad., Tinct. Caryophylli, Tinct. Rhei Aquos, *Trilactine*, Troch. Antacidi., Pulv. Dyspeptic Co.

Alimentary toxæmia.—It is a good plan to conclude each meal in strange places by taking a few drops of Hydrochloric Acid to reinforce the action of the gastric juice. For general use as a digestive, should be in larger doses than those usually given, *e.g.*, 10 to 15 drops in ½ pint of sweetened water, as a drink during or after meals.—B.M.J. i./13,545.

Dyspepsia, Neurotic.—Control secretions of the stomach and lessen the hypersensitiveness of its mucous membrane, *e.g.*, with a small dose of Atropine, Morphine and Adrenalin in Spirit of Peppermint to be taken in water a ¼ hour before breakfast, luncheon and dinner. Counteract hyperacidity when it arises with Mag. Carb., Sodium Bicarb., Bismuth Salicyl., and Ginger in a cachet. For constipation Ext. Colchici, Aloin, Capsicin, and Ext. Rhei alternate evenings, efficient. When digestion normal again more generous diet and tonic, *e.g.* Carbolic Acid, Valerian, Sodium Arseniate and Cannabis Indica in a capsule *t.d.*—B.M.J. ii./11,1524.

For Fæces Examination see Vol. II.

Dyspnœa.—Æther Spt., Æthyl Iodid., Alcohol, Ammon. Carb., Amy Nitris, Erythrol Nitrate Tablets, Euphorbia Peplus, Ibogaine, Lobelia, Morphine, Nitroglycerin, Oxygen and Alcohol, *Oxygen injected*, Ozonic Ether, *Pil. Caffein Tri-Iodid. Co.*, Quebracho and Aspidospermine, Sodii Nitris, Strychnine.

Air-hunger or acidosis may arise when diabetic patients are either taking an excess of Carbohydrates, or on the other hand when the Carbohydrate is too suddenly removed from the dietary.—N. Tirard, Clin. Jl., April 5/11

Earache. (*Local use.*)—*Atropinæ Liquor or Oleatum* (*diluted*). *Chloroformi Vapor*, *Cocaina cum Oleo*, Glyc. Acid Carbolic 6 grains to ounce-slightly warmed, 2 or 3 drops, Guttæ Spiritus c. Formalin, Menthol-Paraffin, Capsules, *Morphinæ Oleatum* (*diluted*), *Opii Tinct. cum Oleo Olivæ*, Ung. Lanoboric Camphorat. *See also* **Nebulæ.**

Eclampsia (and *see* **Convulsions**). Thyroid Gland (*Standardised*) and Parathyroid (Prophylactic), Veratrum Viride.

Calcii Chlorid. transfusion, *Calcii Lact.*, Chloroform, Leech Extract (Hirudin), Potass. Bitart., *Saline Transfusion* (not advised by all).

Etiology and Treatment.—B.M.J. ii./12,1122.

Eczema.—*Alibour Water*, Arsenobenzol and other Arsenic preps., *Calcii Iodid.*, Calcii Lactas (for œdema, redness and itching), *Colloidal Ag.* and *Hg.*, *Cupri Sulphas and Sulphur*, Harrogate Water, Iron Salts, *Milk and Glycerophosphate*, Morrhuæ Ol., Phosphorus, *Sodii Carb.*, *Sodii Citras*, Sulphides, Sulphur, *Thyroid, Three Gland, and Four Gland Tablets*, Trilactine (Tabs. and Milk), Vaccine Staphylococcic.

Acid. Boric., Acid Camphoric. Lotio and Ung., Acid Carbolic. Lotio. and Ung

Acid Salicylic Ung and Ol., Acid Picric, Solution ½ to 1% and Ol., *Alkaline Lotions*, Anserine Mulls, Medicated, Argent. Nitrat. Sol. (particularly for mucous surfaces of anus, vulva, etc.), Balsamum Lanolinatum, *Bismuth Nit Glycerin*, Colloidal Silver, Mercury, etc., *Calaminæ Lotio* (et Oleosa), *Calcis Aqua Calcis Linim.*, *Chrysarobini Ung.* (*weak*) *Cremor Sicc.* preps., *Creolin*, *Diachyli*,, *Ung.*, Formalin, Moist (for dry condition), Formosyl, *Formosyl Huile de Cade*, Hydrogen Perox., *Ichthyol and Collodion and paste of*, Iodates, *Kaolin Ung.*, Krebisoti Ung., *Lanolin*, *Lotio Nigra*, Lotio Plumbi Lactat., Formosyl *dusting powder*, *Methylene Blue*, *Myelocene*, *Naphthol*, Pellanthum preps., Perfumed Formosyls, Phenoloid Disinfectant (diluted), Pigment Olei Eucalpyt. et. Ac. Salicyl. Ung. Hydrogen Perox., Ung. Thorii Oleatis, *Ung. Rumicis*, *Ung. Rusci Co.* Vaccine Staphylococcic, Vleminckx's Solution, 'X' rays and Finsen Light,, *Zinci Boras*, *Zinci Cremor*, Zinc Ions (Pustular eczema), *Zinci Oleat. Pulv.*, *and Ung.*, *Zinci Ung.*

Ointment of Liquor Carbonis Detergens 1, Ung. Hyd. Nit. 3, Ung. Simplicis 4. Also Liq. Carbonis Det. in Lotion c. Liq. Plumbi *a.a.* 3 to 4%.

Eczema, treatment of.—P.J. i./11,524. Eczema of Infants, obstinate.—*Thyroid Gland has been suggested.*—(*Standardised preparations.*)

Seborrhœic eczema is attributable to a relative acidosis. Alkalis, *e.g.*, the mixture of Langdon Brown as used for control of acidosis in diabetes effectual—Sodium Bicarbonate 1 drachm, Potassium Citrate 30 grains, Calcium Lactate 5 grains, Magnesium Carbonate 5 grains, Chloroform Water to 1 ounce.—H.M Barber and H. C. Semon, B.M.J. ii./18,245.

Electric Current Injuries.—*See* **Radiology** Vol. II.

Elephantiasis.—Arsamin, Pituitary Extract.

Emetics.—Apomorphine $\frac{1}{10}$ grain inject. hypod., Antim. Tart. 1 to 2 grains, and Vinum 2 to 4 drachms, Ipecac. 30 grains, and Vinum 4 to 6 drachms, Mustard a tablespoonful, Sodii Chloridum a tablespoonful, Zinci Sulphas 20 to 30 grains. *See also* **Poisons and Antidotes.**

Empyema.—Hydrogen Peroxide for washing the pleura (10%), *Streptococcal*, and Pneumo. Vaccine. Succus Allii.

Douching with Dakin's Solution.

Emphysema.—Iodides and Iodine preparations, *e.g.* Caffeine Tri-Iodide. If patient too stout add Thyroid to the Iodine. If excess of lime in the blood Sodium or Potassium Citrate or Lemonade Purgative. Keep bowels open with Sodii Sulph.

Endocarditis.—Aconite, Belladonna, Caffeina, Collargol, Coronillæ Ext., Digitalis, Fæxin, *Ferric Chloride*, Nuclein and Anti-Streptococcic Serum and *Vaccine*, *Pituitary Extract*, *Pneumo .Vaccine*, Veratrum.

Belladonna Plaster, *Blisters*, *Ice Bag*, Eusol intravenously.

Autogenous Vaccine and Autogenous Serum (latter if possible). A grave case recovered under.—See Strepto Vaccine.

Endometritis.—Injectio Formalin, Copper Sulphate (and Ionised), *also* Zinc Ions. *Local use of Churchill's Iodine Tinct.* Pond's Tampons.

Curetting is indicated and if menorrhagia a marked symptom, *i.e.*, a case of so-called hypertrophic endometritis, follow the curetting by injecting a 50% solution of Formalin which is allowed to act for a varying number of *seconds*, according to the effect one wants to produce on the endometrium. It is also well to complete the operation by plugging the uterus with Iodoform Gauze, which is left in place for 24 hours.—Pr. Oct. '10, p. 45 *et seq.*

Enteritis.—*See* **Gastro-enteritis.**

Enuresis.—Atropine, Belladonna, Ergot, Hyoscine, Hyoscyamus with Sodium Bromide, *Hexamethylenetetramine*, Lycopodium, Potassi Citras, Rhus Tox., Thyroid Extract (Standardised Preps.).—*See also* **Incontinence of Urine.**

Sulphonal 1 grain for each year of the child's life every night for the first week, every other night for the second week, and every third night for the third often permanently cures enuresis.— T. Fisher, L. ii./17, 728.

Epididymitis—Aconite, Antimonial Wine, Iodides, Saline Purgatives.

Atropine Suppos. (1·75 gr.) and hypod., Colloidal Mercury and Silver, *Ice*, Iodine, Guaiacol, Iohydrin, Iodum Oleat. *Lin. Potassii Iodid.*, *Ung. Iodi Intinctum.* *Heat with moisture*, *Mercury*, *and Belladonna Ointments*, Gono Vaccine (and Sensitised).

Epilepsy.—Adonis. Æthyleni Bromid.. Ammon. Bromid., Amyleni Hydras, Amyl Nitris, Antifebrin, Argent. Cyanid or Nit., Arsenic. Arsen. Brom., Atrodine, Auri Bromid. and Chlorid., Belladonna, Borax, Bromalbumen, Bromalin

Bromal Hydras, Brominol, Calcium Bromide, *Calcium Lactate*, Camphora Monobromata, Crotalin, Cannabis, Chloral, *Elix. Calcii Chlorid.*, *Guipsine*, Hydrargyri Biniodidum, Liquor Auri et Arsenii Bromid. and Liquor Auri et Hydrarg. Bromid., Magnesium Bromide, Manganese Bromide, Mistura Brominol cum Nux Vomica, *Morphine Methyl Brom.*, Nitroglycerin Tablets or Liquor, Ozonic Ether, Palladium Colloidal, Picrotoxin, Potass. Bromid., Pot. Nitris, Santonin, Scutellaria, Sodii Bromid., Sodii Nitris, Solanin. Strontii Bromid., Thyroid Ext., Urea-Bromine, Valerianates, Verbena, *Viscum album*, Zinci Bromid.. Citras, Lactas and Sulphas.

Prevent constipation.—Cascara, Calomel, etc

Treatment of epilepsy.—L. i./10,355.

See special remarks, under Potass Bromid. and L. ii./10,217

In most cases Bromides are not of the slightest value and in many are actually pernicious.—C. A. Mercier, B.M.J., ii./15,624.

Potassium Bromide 1 ounce, Potassium Bicarbonate ½ ounce, Liquor Arsenicalis 1½ drachms, Liquor Arsen. et Hydrarg. Iodide 3 drachms, water to 8 ounces, Signa: Two drachms in water after meals three times a day. "Marvellous in effects."—P.J., i./15,150.

Epistaxis.—Acid. Gallic., Aconite, Acetanilide, Calcium Chloride and Elixir Digitalis, Ergot inject. hypod., Erigeron Oil, Ferro-Alumen, Ferri Perchlorid. Hamamelis, Terebinth. Oleum.

Acid. Tannic., Adrenalin, *Alumen*, *Amyl Nitris*, *Ferri et Quininæ Chloridum*, *Ice*, *Hamamelis*, Hydrogen Peroxide.

The best position during an attack of epistaxis is reclining in an easy chair with the hands clasped behind the head, and the collar loosened. In this position the chest is fully expanded, and the venous return from the head is facilitated. The blood as it trickles backwards into the pharynx may be swallowed or spat out by inclining the head to one side or the other. Hanging the head down over a basin keeps the veins of the nose full and gives the bleeding no chance to stop.

Bearing in mind the frequency of the bleeding from Kiesselbach's spot, a pledget of cotton-wool should be inserted into the nostril and pressure applied outside with the finger and thumb. The pledget of wool should not be pushed in for more than half an inch or so, the bleeding area being about opposite to the depression immediately above the ala of the nose. No styptic—*plain dry wool is all that is necessary.*

Cold may be applied to the nape of the neck or to the bridge of the nose with the idea of causing reflex contraction of the bleeding vessels; if it is not quickly successful it should not be persisted in. Hot water (at 115° Fahr.) injected with a syringe may prove successful where other means fail.

Perchloride of Iron or other caustic substances should never be used under any circumstances. If above fail, introduce a strip of ribbon gauze, about 18 inches long, soaked in equal parts of Adrenalin Chloride (1 in 1,000) and Cocaine Hydrochloride (20%), so as to bring it in contact, as far as possible, with all parts of the nasal mucosa; after 5 or 6 minutes the plug should be withdrawn and an attempt made to discover the bleeding spot by means of a head-light and speculum; should the bleeding spot be discovered it may be possible to control it by direct pressure or by application of the galvano-cautery, or if the bleeding persists the nose should be packed with strips of ribbon gauze.—E. W. Roughton, Pr., Oct. 1910

Epithelioma.—Radium, *see also* **Cancer.**

Erysipelas.—Acetanilide, Aconite, Aconitina and Granules of, Antifebrin, Antistreptococcic Serum, Belladonna, Digitalis, Ergot, *Fœxin*, *Fœxin Extract*, Ferri Perchlorid., Nuclein, Veratrum viride, *Streptococcal Vaccine*, *Buttermilk* internally and locally

Acid. Picric Pigment, *Acid. Sulphoros. Lotio*, *Amylum*, *Amyli Glycerin.*, *Argent. Nit.*, *Belladonnæ Glycerin.*, *Calaminæ Lotio*, *Cocainæ Ceratum*, *Collodium Creosotum et Amylum*, *Gossyp. Acid. Boric.*, Hydrogen Peroxide Diluted and Borated, Ichtho sulphol Ung. Iodine Colloidal, *Iodi Pigment*, Iodi. Tinct. injected *q.v.*), Iodates, *Iodum Oleatum*, *Ung. Iodi Inunctum*, *Iohydrin*, Liq. Alum Acet., Mag. Sulph. Solution, hot fomentation, Oleogen Comps., *Pasta Plumbi cum Cupro*

Erythema.—Febrifuge Salines, Aconite, Anthemis, *Calcii Lactas*, Salicin, Salicylates, Salol, Trilactine, *Sulphur Stearettes.*

Amyli Glycerin., *Anthemid. Infus.*, *Diachyli Ung.*, Hazel Foam preps., *Kaolin and Lotio. or Ung.*, *Papav. Infus.*, *Perfumed Formosyls*, *Plumbi Subacet. Lotio.*, *Vaseline, Zinci Oxid. and Ung., Ung. Thorii Oleat, High Frequency Current Pellanthum preps.*

Espundia.—Antim. Pot. Tart.

Exhaustion.—Nervous and Muscular.—Oxygen Inhalation (*and with Alcohol*), Amyl Nitrite Capsule, Stimulants, *Casha Milk and Glycerophos.*, Coca preps. Coca Wine. *Cf.* other headings, *e.g.*, **Anæmia, Collapse and Fainting, Debility, Food, Hæmorrhage, Nervous debility, etc.**

Exophthalmic Goitre (Graves' Disease).—Arsenic with Mercury Tablets Arsenic with Sodium Bromide, Belladonna, Calcium Salts, Digitalis, Duboisine, Fucus, Iodine preps., Iodinol, Iodo-Protein, Iron Salts, Lactic Acid Bacilli, Pituitary Dried (Posterior lobe), Potass. Iodid., Quin. Hydrobrom. and other preps., Sodii Salicyl., Sparteine, Suprarenal Extract, *Sodii Phosph., Thymus Gland, Thyroidectin.*

Fresh Thyroidless Goats' Milk.

Tinct. Iodi Oleosa, Ung. Iodi, Ung. Iodi Intinctum, and Iohydrin. X. Rays. In exophthalmic goitre Calcium Index is low *c.f.* Calcii Chlorid. and B.M.J ii./09,592.

Digitalis and Strophanthus by allaying the rapidity of the heart's action may give rest and cause patient to seem better. Iodine and Iodides in treatment of simple goitre. The apparent benefit of Sodium Phosphate in Graves' disease and use of Calcium Lactate appear to support the theory that the thyroid plays an important part in the chemistry of the blood salts.—L. i./13,590.

In this disease possibly there is not only an increase in the amount of thyroid secretion formed and absorbed, but in some cases the proportion between the different ingredients of the secretion vary. Suprarenal gland feeding has been tried, but is not well spoken of.—' X ' ray treatment is best —G. R. Murray, B.M.J. ii./13,163 ; L. ii./13,200.

(Iodoform has tendency to produce symptoms of exophthalmic goitre in susceptible persons.)

Eye: Optic Atrophy. Retinal extract has been amazingly (unexpectedly) successful.

Eye: Pupil, Contractors of.—*Arecoline in 1% solution, Jaborandi and Pilocarpine, Opium and Morphine, Physostigma, Physostigmine*

Eye: Pupil, Dilators of.—Adrenalin (no refs. to therapeutic use), *Atropine Salicylate and Sulphate, Atropine-Methyl Bromide, Belladonna, Cocaine, Daturine, Duboisine, Ephedrine, Homatropine and Hyoscine salts, Hyoscyamine, Nicotine, Oleum Atropinæ, Oleum Homatropinæ, Scopolaminæ Hydrobromid.*

Organic Extracts, *e.g.*, suprarenal and pituitary, have marked effect as pupil *dilators*,—thymus, ovary, muscle and kidney less.

Eye: Local Dilator, but Contracts when given internally in suitable doses—Gelseminine.

Fainting.—*See* **Collapse.**

Favus.—*See* **Parasites, Vegetable, on Skin.**

Fetid Breath.—*See* **Breath, Fetid.**

Fetid Perspiration.—*See* **Perspiration, Fetid**

Fetid Nasal Discharges.—*See* **Ozæna.**

Fever.—Acetanilide, Acid. Salicylic, Aconite, Amidopyrin, Ammon. Acet. Liq. and Carb., *Ammon. Cit.*, Antifebrin, Antimony, Aspirin, *Bisciniod*, Cinchonine, Cinchonidinæ Sulph., *Cryogenin*, Digitalis, Gelsemium Granules d'Aconitine, Mist. Arsen. Quin. et Ferri., Magisal, Monobromacetanilide Phenacetin, Phenazone, *Pulvis Quininæ Comp.*, *Potassii Borotartras*, Potass. Acet., Chloras and Citras, *Pilula Antimon. Conii et Quinin.*, Quinine preps. Quinidinæ Sulph., Quinetum, Salicin, Salipyrin, Sodii Salicylas, *Tylcalsin Tyllithin*, Veratrum Viride, Warburg's Tincture, Tinct. Oleæ Fol. (Tonic) *Helba*, *Quinin. Acetyl-Salicylate.*

Fibrosis, Chronic Subcutaneous.—Fucus, Thyroid, Diabetic Diet, Massage, etc.

Fibrositis, Acute.—Amidopyrin with Aspirin. *Chloral et Menthol, Pigment Camphoræ.*

Filariasis.—Organic Arsenic Compounds. Pepper and Capsicum, *e.g.* Tinct. Capsici, thought to be prophylactic.

Filarial infection in Macedonia.—J. G. Forbes, **L.** i./19.654.

Fissures of Nipples.—*Acid Boric, Acid. Tannic Glycerin., Alcohol. Argent. Nit. pigment, Cocainæ Hydroch. Liquor, Collodium Flexile, Hydrastis Tinct., Plumbi Subacet Glycerin., Styptic Colloid, Tinct. Benzoin Co.*

Fistula in ano (Tuberculous).—*Hydrogen Perox.*, Inj. Bismuth Subnit., *Iodine Suppos.*. Tropacocaine Intra-spinal Inj. prior to operation, Iodoform Oil after operation, Pot. Permang. (packing with), Zinc ions.

Flatulence.—Acid. Carbolic., Acid. Sulphuros., Æther Spt., Alkagen Tabs. Asafetida. *Aq. Carminativa*, Betol, *Bisciniod*, Bismuth preps., *Bismuth Tart. Solub.*, Cajuput Ol., Capsicum, Carbo Ligni, Chloromorphiæ Liquor, Creosote, Magnesia preps., Menth. Pip. Ol., Naphthalene, Naphthol, Nux Vomica Pepsin preps., Sodii Bicarb., *Sodii Sulphis*. Sulpho-carbolates, Tinct. Carminativa, Zingiberis Tinct., Anise, *Anethol*, Cinnamon, Cloves and Tincture, Asafœtida, Caraway, Cardamoms, Coriander, Fennel, Myristica, Trilactine.

Flies to Ward Off. *See* **Bites and Stings.**

Food Products.—*See* **Chapter on Nutrimenta**, (also *Infant Feeding*), *Casein Preparations*. For invalids are: Benger's Food, *Catha Milk and Glyceroph.*, *Conf. Glyceroph. Co.*, Enema Nutriens, Ferrocarnis, Herogen Kreochyle, Kolentos, Peptonoids of Beef, *Milk and Glycerophosph.*, Nutrient Suppositories, Peptonised Milk, Peptonised Beef Jelly, Pancreatised Farinaceous Food, Pancreatised Emulsion of Fat, Pavimol, Secwa, Trilactine, Saccharated Wheat Phosphates.

For Diabetic Foods, see Nutriments, Vol. I. For Bread Standardisation, Flour Bleaching, and Caloric Values of Foods, see Nutrimenta, Vol. II.

Artificial Feeding.—Dextrose (Glucose) Enema, Glucose Injection.

Fractures, for applying extension in.—Sinclair's Glue, Heusner's Glue.

Frambœsia.—Organic Arsenic Comps.

Freckles.—*Hazel Foam*, *Boric Acid Lotion*, *Corrosive Sublimate Lotion*, Lactic Acid Lotion, Cucumber Ointment, Formosyl (diluted), *Mistura Amygdalæ*, Thorii Oleat. Ung. diluted to a cream, *Ung. Plumbi Carbonatis*.

Frost Bite.—Soldiers should practise massage on their feet before going to the trenches and when resting. Moleskin leggings as leg coverings in preference to puttees.—J. Lorrain Smith, Jas. Ritchie, and Jas. Dawson, L. ii./15, 595, 629, 674.

Massage with Cocaine 8 grains, Olive Oil 4 drachms, Lime Water 4 drachms, *i.e.*, Carron Oil with Cocaine. Addition of Liquid Paraffin 1 ounce to the 4 ozs. of Oil useful. When the oil dries on the feet use as dusting powder Camphor 25 grains, Zinc Oxide and Starch of each ½ ounce.—C. Davis, L. i./15,676.

Local application of Eucalyptus Oil, Methyl Salicylate Oil, and a mixture of Castor Oil, Glycerin, and Atropine. In cases of blisters and ulceration, dry dressings, *e.g.*, Boric Acid or a powder containing Bismuth.—C. Miller, L. i./15,801.

True frost bite of the ears—very hot water useful.—B.M.J. i./15,880.

Waterproof Anti-frigor (Oil Silk) bags as preventive.—Prof. Delépine, B.M.J. ii./15,888.

Friction with snow or cold water in a cold room best. Friction with Turpentine and Oil or with Spirit and Soap Liniment useful in early stages and after that the limbs should be raised on pillows and wrapped in cotton wool. If blisters form or discoloration shows that gangrene is probable rub with Turpentine to clean the skin or with Spirit containing 1 in 500 Biniodide—or with Iodine.—A. W. Mayo-Robson, L. i./15,118.

Give Lime Salts—*e.g.*, Lactate.—Frances Ede, L. i./15,203.

A stiff ointment made with Suet containing Camphor and 5% Eucalyptus Oil—in a tube like a shaving stick.—R. Douglas Powell, L. i./15,253.

Peroxide 5% solution with Tinct. Iodine 1 dr. to the pint applied as compress 12 hours followed with dry boric wool.—L. Wainwright, L. i./15,297.

Free use of Whale Oil or Vaseline as preventive.—L. i./15,373.

Keep the parts *cold* with foot raised slightly—smeared with some ointment. Wrapping up *causes pain*.—B. Moynihan, L. i./15,401.

Where there is moist gangrene, and especially where toxic absorption has taken place—amputation.—R. H. Jocelyn Swan, L. i./15,627.

Counter irritants—Tincture of Iodine, Turpentine, etc., relieved pain for a time, but do not materially affect speed of recovery.—C. Max Page, L. i./15, 590.

Boric Zinc and Starch Powder.—F. McG. Loughnane, L. i./15,805.

Thyroid might be tried as prophylactic.—A. G. Gray L. ii./15,779.

FURUNCULOSIS, *vide* BOILS.

Furunculosis Orientalis.—Inj. Antim Ox.. and Antim. Pot. Tart. For Nile boils—Strepto. vaccine.

Gall Stones and Hepatic Colic.—Æther Spt., Amyl Nitris, Amyl Valerianate, Anæsthetics, *Capsul. Sodii Oleat. Comp.*, Chloral Hydras, Chologen, Hexamethylenetetramine, Iridin, Magnesium Sulphate, Mercurials, Morphine preps., Nitroglycerin, Perles of Ether and Turpentine, Pil. Sodii Oleat. Podophyllin, Salicylates, Sodium Benzoate, Sodium Glycocholate, Various Mineral Waters, *q.v.* An address on. Waterhouse.—L. i./09,1301.

Turpentine has been injected through the cystic duct.—B.M.J. ii./08,1808.

Gangrene.—Nitroglycerin, Amyl Nitris, Sodium Nitrite.

Acid Carbolic, Acid Nitric, Bromine, Creosote, Hydrogen Perox., Iodine Injection (vagina), Saline Injection (vulva).

GAS GANGRENE.—Sodium Lactate. See also Vol. II.

Gas Poisoning. *See* GAS under **Antidotes** to **Poisons.**

Gastralgia.—Acid. Hydrocyanic. Dil., Æther. Spt., Alkalis, Belladonna, *Bisedia, Bisciniod,* Bismuthi Oxy-Bromid., Bismuth Oleas, Bismuthi Salicylas, *Bismuth Tart. Solub.*, Bromides, Calcis Aqua, Cannabis, *Catha Milk and Glyceroph.*, Cerii Oxalas, Chloroform, Chloromorphiæ Liq., Coca and Cocaina, Codeina, Creosote, Ginger, Magnesia, Cremor Magnesiæ, Manganesii Oxid., Pepsin. *Sedeff, Senecio, Iodates, Chloretone, Cyanides,* Menthol, Nitroglycerin *Trilactine.*

Linim. Sinapis, Ung. Ipecac. et Crotonis.

Gastric Catarrh.—*See* **Catarrh, Gastric.**

Gastritis and Enteritis.—Ammon. Chlor., Bismuth preps., Bisciniod, Bismuthi Benzoas, *Bismuth Oleas,* Bismuth Tart. Solub., Calcii Permang. and Salicylas, Carminatives and Sedatives, Collargol, Hydrastis, Hydrog. Perox., *Saline Transfusion,* Sanguinaria, *Sodii Sulphis,* Strontium Salts, Tar Perles, *Trilactine Tablets, Milk, &c.* *Vide* also **Catarrh, Gastric.**

Gastric Ulcer.—*See* **Ulcers, Gastric.**

Hæmatemesis of.—Adrenalin, Beef Peptones.

Gingivitis, *see* **Gums, Inflamed,** also **Vincent's Angina.**

Glanders.—*Mallein,* by hypodermic injection. Mercurial Inunctions, *Salvarsan.*

Glands, Enlarged.—Calcii Chlorid., Ferri Iodid. and Iron Salts, *Ferri Cacodylas, Iodoprotein Tabs,* Iodum, Morrhuæ Ol., Potass. Iodid., Sodii Iodid., *Syrupus Iodo Tannicus.*

Cadmii Iodid. Ung., Hydrarg. Oleat. and Emplast., Iodi Decolor. Tinct., Iodoform, Iod. Linim. and Ung., Iohydrin, Pot. Iodid. Ung.

Glaucoma.—*Physostigminæ Sulph. and Oleum, Pilocarpina,* Alkaloidal Oil of Physostigmine, Arecoline.

A note on.—Subconjunctival injection of Sodium Citrate Solution 4·05 to 5·41%.—L. i./12,226.

Glossitis.—Hydrarg. Perchlor. in Lotion (2 gr. to 8 ounces).

Glycosuria.—*See* **Diabetes.**

Goitre.—Acid. Hydrofluoric. Dil., Arsenic, *Barii Chloridum,* Belladonna, Bromides, *B. Coli Vaccine,* Convallaria, Hydrarg. Biniodid., Hydrastis, Iodum, Phosphorus, Pituitary Gland Dry (entire gland), also Posterior lobe alone, Potass. Iodid., *Quinine Periodide,* Sodii Iodid., *Syr. Ferri Iodid.*, Thymus Gland, *Thymol* in large doses, Thyroid feeding and preps., *Trilactine Milk.*

Acid. Acetic. inj. hypod., Acid. Osmic. inj., Hydrarg. Biniodid, Ung., Hydrarg. Oleat., Hydrarg. Ung., Iodi inj. hypod. T. H., Iodi Linim. and Ung., Cocaine Ionisation, 'X' rays.

Endemic goitre, the etiology of.—With the possible exception of rats, animals do not readily acquire the disease in experimental conditions. Water is capable of conveying in some manner as yet incompletely explained, the toxic agent of endemic goitre.—Major R. McCarrison, 1st Lecture, L. i./13,147.

Experimental production in man by drinking goitrous water of Gilgit. Swelling in the thyroids noted in 15 days,—neck increased in size 2½ cm.—2nd Lecture, L. i./13,223.

Goitre well treated by Vaccines of organisms obtained from fæces of sufferers, good result also from sources other than the fæces, *e.g.*, a Staphylococcus Vaccine derived from a case of caries of bone. Animal experiments on fæcally infected water for periods up to 108 days showed there was a tendency for the thyroid gland to be larger than normal.—3rd Lecture, L. i./13,369. *Vide* also our page 744.

An address on Goitre.—H. G. Boyd, B.M.J. ii./19,169.

GOITRE EXOPHTHALMIC, see EXOPHTHALMIC.

Gonococcal Arthritis.—Gonococcus Vaccine, Vaginal Douche with Hyd. Perchlor. Lotion (of women), Mag. Sulph. Solution, hot fomentation, Santalol, *Tylcalsin and Tyllithin.* See also Gonorrhœa

Gonorrhœa.—Aconite, Buchu, *Camphoric Acid, Camph. Monobrom, Cannabis*, Copaiba, Cubels, *Cyperi Caps., Erigeron Oil*, Helmitol, Hetraline, *Hexamethylenamin*, Hydrastis, Kava-Kava, Methylene Blue, *Ol. Cedri Atlantic*, Pichi, Potassium Salts, Saline Aperients, Salix nigra, Salol, Santal preps., *Santyl, Santalol*, Santalol Capsules, also *Santalol-Methyl-Salicyl Caps., Sodium Acid Phosph.*, Saw Palmetto, Sodii Salicyl. (especially acute posterior urethritis, Uritone, Hydrastis, Uva Ursi, *Gonococcus Vaccine* detoxicated also sensitised and Pus Vaccine, Mineral Waters, *e.g.*, Vittel.

Acid. Carbolic., Acid. Salicyl 2% alcoholic solution compresses, *Acid. Tannic*, Acriflavine, *Argenti Acetas, Nitras Injection and Bougies, Argent. Iodid., Bismuth Oxyiodid., Bougies Urethral, Collapsubes various* (*see Index*), *Collargol, Colloidal Ag. and Hg., Glyc. Plumb. Acet.* (compresses), Hydrarg. Oxycyanid., *Hydrarg. Perchlor.*, Hydrog. Perox., Iodargol, *Iodoformi Cereolus, Iodof. et Euclypti Cereolus*, Leistikow's and Neisser's Bougies. Manganese Colloidal, Proflavine, Palladium Colloidal, *Potass. Permang., Protargol, Resorcin, Uritone, Zinci Acetas, Chlorid., Permang., and Sulphocarbolas*, Zinc Sulphanilas. *For female, Pessaries of Ichthyol or Iodine, Argenti Iodidum, Hydrastis, Ovules* various, see text, Zinc and other Ionisation.

More rigorous standard of cure in treatment of gonorrhœa.—E. R. T. Clarkson and A. Malcolm Simpson, L. ii./18,731.

Marked success from Permanganate Solution, 1 in 1,000 given to men with instructions.—Sir A. Reid and P. H. Boyden, L. i./19,212.

TREATMENT FOR CURE WITHIN A WEEK:—

1. Commence by giving a 3 gallon irrigation with Potassium Permanganate solution (about 1 in 5,000). Sufficient fall must be allowed to drive the fluid up to the neck of the bladder.

The two-way irrigation tube used for this purpose may be improved by the addition of a glass handle, thus preventing the fingers from being stained, and enabling patient to keep the tube more easily in the correct position. 2. Now irrigate under as high pressure as possible with 3 gallons of distilled water, followed by a similar quantity of a solution containing 1 oz. of Protargol. 3. Next irrigate (under pressure) with one quart of Chloride of gold solution (at least 30 grains to the quart). For this injection use a single-way irrigator nozzle. Wash, after an interval, with distilled water. 4. Give patient instructions to use an injection of Protargol (½ per cent.) eight or ten times during the ensuing twenty-four hours. At night a Neisser bougie 6 in. long, and containing 1 per cent. Protargol and 2 per cent. Antipyrin, is inserted and tied in.

The above mentioned irrigations are repeated in increasing strength on the second, third and fourth days. 5. On the fifth day 3 gallons of weak Sulphate of Zinc Solution, and on the sixth day a similar amount of weak Nitrate of Silver. The exact strength of these last irrigations varies according to the severity of the case. The cure is almost invariably complete. In a very few instances an additional day or two is required.

The large quantities of fluids used in the irrigations are claimed to be of importance.—A. C. Migian.—B.M.J. i./11,1463.

The quickest apparent recoveries are from the following:—(1) Irrigation of the urethra thrice daily with large quantities of Potass. Permang. (1 in 3,000 to 1 in 4,000) till discharge has diminished. Then (2) Injection of zinc and copper solution after each irrigation till discharge has practically ceased, and, finally, (3) Injections of Protargol Jelly in place of the zinc and copper after massaging the prostate and irrigating the urethra. (4) Atropine suppositories (1/75 gr. in each) twice daily.—L. W. Harrison and C. H. H. Harold, R. A. M. C. Jl., Oct., 1912.

Gangrenous cystitis of gonococcal origin. Bladder irrigated with 1 in 5,000 Silver Nitrate. Patient died of gonoccocal septicæmia.—A. Clifford Morson, B.M.J. i./19,129.

Growth, to Stimulate.—Pituitary gland dry (anterior lobe) has been thought to. Tethelin (also used locally). *See also* Debility, Marasmus, etc.

Gout.—Acid. Quinic., Acid. Thyminic, Aconite, Arsenic, Aspirin, Bromal Hydras., Caffein Tri-iodide, Colchicine Salicylas (*Capsules*), Colchicum and Colchicin, Elix. Acid Salicyl. Co., Formates, Glycerophosphates, Guaiacum, Hexamethylenetetramine, Hydrangea, *Iodine Tinct.*, Iodolysin, *Iron preps.*, Kava-kava, Lithii Carbonas, Citras, Hippuras, Tartras, Tartras Acida. Lithion, Magnes. et Sodii Sulph., Morphine Injection Hypodermic, Phenazon and with Codeine, Phenoquin, Piperazin, Glycerophosphate, Piperazin and Phenocoll

Granular Eff., Piperidin Guaiacolas, Radio-active Waters, Tartras, Pistoia Powders, Potass. Acet., Cit., Iod., Pot. Chloride as Table Salt, Sodii Bicarb., Benz., Hippuras, Iodid., Phosph., Salicyl, *Sesquiphos.* and Taurocholas, *Solani Ext. Liq.*, *Syr. Ferri Iodidi*, Trilactine, *Tylmarin*, Urea Quinate, Veratrum,

Amysal, *Borax Solution*, locally Cade Oil, *Cocaine Ionisation*, Chloroform, Liniment, *Collod. Salol*, Ionised Lithium, Methysal Balm, Nauheim Bath Salts, Radium. 'X' Rays are useful. *Ra Emanation Inhalation.* Salicylic Acid, also Iodine Ionised.

A bacterial toxin is the primary factor. Adequate removal of the intestinal contents at the commencement of attack will reduce the symptoms.—Luff.

Calf Lymph Vaccination has improved Gout.

Acetic Extract of Colchicum, B.P.85—is best, the effective dose being 2 to 6 grains.—J. S. Matthews, B.M.J. ii./19,271.

Granular Eyelids. *See* Ophthalmia Tarsi.

Granuloma Inguinale.—Antim Pot. Tart.

Graves Disease.—*See* **Exophthalmic Goitre.**

Gums Inflamed and Spongy. (*Local use.*)—*Acid. Carbolic.*, *Alumen*, *Anise mouth wash*, Borated Hydrogen Peroxide, Catechu, *Cocaine*, *Cremor Magnesiæ*, *Formosyl Mouth Wash*, *Iodi Tinct., and cum Aconiti Tinct.* Iodine Colloidal, *Krameriæ Tinct.*, *Listerine*, Magnes. Lact., *Myrrhæ et Boracis Tinct.*, *Potass. Chlorat.*, *Pastil, Tablet and Troch*, *Pyrethri Tinct.*, *Sodii Chloras and Troch.*, *Thymaglycin.*

Acute Ulcerative Gingivitis—Thymol water, and after drying swabbing with 5% Silver Nitrate Solution, and again washing with Thymol.—C. J. Colyer, B.M.J. ii./18,396.

Hæmatemesis.—Acid. Gallic., Acid. Sulph. Dil., Acid Tannic, Adrenalin, Alumen, Argenti Nitras, Ergota, Hamamelis, Iron Persalts, Peptonised Milk, Plumbi Acet., Suprarenal Extract, Terebinth. Ol.

Hæmaturia.—Acid. Gallic., Antimony, Camphor, Cannabis, Erigeron Canadense, Ergota, Hamamelis, Rhus aromatica, Terebinth. Ol.

Vesical Injections of Adrenalin, Alum, Gallic Acid, Hamamelis.

Hæmophilia.—Calcii Chlorid. and Lactas, Magnes. Chlorid., Carbonas and Lactas, Ergot preps., Hamamelis, Hydrastis, Iron Persalts, Strontii Chlor. Carb. or Lact., and for surface bleeding see local remedies under Hæmorrhage. *Phenazone in Ferri Perchlor., see Phenazone.*

Hæmoptysis.—Acid. Gallic., Acid. Pyrogallic., Acid. Sclerotic., Acid. Sulph. Dil., Alumen, *Alum. Aceto. Tart.* ***Amyl Nitrite Capsules,*** Atropine, Bromides, Chloral, Digitalis, Emetine Injection, Erigeron Canadens, Ergota, and Ergotin, *Gum Acacia with Saline*, Hamamelis, Morphine, Nitroglycerin, Opium, Phenazone, Symphytum, *Rectal Injection of Calcium Chloride*, Viscum preps.

Atomised Spray of Alum or Monsel's Salt Solution

Hæmoglobinuria.—Ammonium Chloride, Calc. Lact., Iron Tonics.

Hæmorrhage of Wounds.—Acid. Gallic., Acid. Sclerotic., Acid. Sulph. Dil., Calcium Chloride, and *Lactate*, Digitalis, Epinene, Ergota, Ergotin, Eucalyptus Gum, Ferri et Quininæ Chorid., Ferro-Alumen, Gelatin, *Gum Acacia with Saline*, Hæmatoxylin, Hamamelis, Ice, Iron Persalts, Plumbi Acet., Potassii Succinas, *Styptol*, Terebinth. Ol. *See also* **Wounds.**

Hæmorrhage from bullet wounds in chest has been controlled by inhalation of Amyl Nitrite.

Local Applications to Wounds and Bleeding Surfaces.—*Acid. Tannic.*, *Albumen*, Amadou, *Anserine Mulls Medicated*, *Bryonia*, *Catechu*, *Cupri Sulph.*, *Cupri Sulphocarbolas*, Epinene, *Erigeron Oleum*, *Eucalyptus Gum*, Eucalypt. Fol. Tinct., *Eusol*, *Ferri Perchlorid.*, *Ferro-Alumen*, *Hamamelis*, Hydrog. Perox., *Monsel's Solution*, *Proflavine*, *Sphagnum Dressings*, *Styptic Colloid*, *Thromboplastin*, *Tinct. Benz., Co.*, *Zinci Chlorid. Liq.* *See also* **Wounds.**

Eau de Cologne was much used by the French Military Surgeons in the recent war to cleanse wounds. *See also* **Wounds.**

Hæmorrhage, Dental, after Extraction.—

Adrenalin, Amadou, *Ergotinine Injection*, Eucalyptus *Liq. Extract*, Tincture, *Ferri Perchlor.*, Tannin, *Tinct. Benz. Co.*, *Turpentine*, *Zinc Sulphate*, *Zinc Sulphate with Morph. Acet.*

If extensive laceration of the tissue has been necessary, anodyne mouth wash, *e.g.*, Zinc Sulphate 8 grains, Zinc Chloride 6 grains, Morphine Acetate 2 grains, Water to 8 ounces.—Smale and Colyer.

Hot water (blood having an insufficient amount of fibrinogen coagulates at 160° F.) Chloroform Water (2%). Sandarach Varnish.

Potass. Permang. Ung. (4% in Vaseline) or Potass. Permang. and Kaolin with small quantity Vaseline.

Hæmorrhage from the Nose.—*See Epistaxis.*

Hæmorrhage, Intestinal—Calcium Chloride, Ergot, Lead Acetate with Camphor or Opium, Acid Gallic, Acid Sulphuric Dil., Formanilid, Suprarenal preps., Turpentine.

Styptic Enemata of Adrenalin. Alum, Copper Salts, Gelatinum Calcii Chlor., *Monsel's Salt Tannin.*

Hæmorrhage, Uterine and Post Partum.—Acid. Sclerotic, Adrenalin, Amyl Nitris inhaled, *Caffeinæ Inject., Camphor Inject.,* Caffeinæ Inject., Cannabis and Chloral, *Copper Ionisation,* Cornutine, Cotarnin, Ergota, Ergotin inj. hypod., Ergotininæ inj. hypod., Ferri et Quininæ Chlorid., Gossypii Rad. Cort., Gum Acacia with Saline, Hydrastin, Normal Serum, Nux Vomica, Opium with Alcohol, Pituitary Ext., Strychnina and Salts, Suprarenal preps., Mistura Ergotæ cum Ferro.

Adrenalin, Alumen, Ferri Perchlorid., Gossyp. and Liquor.

Hæmorrhage, Renal.—Hæmostatic Drugs.

Hæmorrhoids.*—Suitable laxatives are Cascara Sagrada, preps. Cascagar Conf. Piper., Conf. Sennæ, Infus. and Mist. Sennæ Co., Pulv. Glycyrrhizæ Co., 'Hindu Dates,' *Sansiviera Ext. Liq., Stillingia,* Sulphur, Trilactine.

Acid. Boric. Ung. Bismuth Oleas, Bism. Subiodate, *Coninæ Ung.,* Copper Ionised, *Gallæ cum Opio Ung., Collapsubes — Bismuth, Calcium Chloride Injection for bleeding,* Cupri Oleas, *Eucalyptus Gum Suppositories. Glyc. and Ung. Chrysarobin, Hamamelid. Liq.,* Iodine Suppos., Lotio Plumbi Spirituosus. PerfumedFormosyls *Ranunculi Ficariæ Ung.,* Sanusin Sempules, *Stillingia,* Stovaine Ointment, *Suppos. Bellad. et Morph. Suppos. Cocain et Morph., Suppos. Hamam., Conii et Eucainæ,* Suppos. Hamam. et Hydrarg Co. (Campbell Williams), *vide* p. 444. Suppos. Hæmorrhoidal, p. 235. *Suppos. Suprarenal et Morph. Ung. Bismuth et Cocain, Ung.* Thorii Oleat, Uranii Oleas, Zinc Ions.

Injection treatment of hæmorrhoids.—Carbolic Acid 48 grains, Glycerin 2 drachms, Water 2 drachms. Dose: 2 to 6 minims has been injected into each internal pile, *cf.* p. 443.

Hair, to Promote Growth of, *c.f.* SEBORRHŒA.—*Bone Marrow, Hæmoglobin and Tonics.*

Amyl Nitrite, Cantharides, Jaborandi Liniment, Pilocarpine Lotion, Resorcin Lotion, Sublimate in Spirit Lotion.

Hair, to Remove.—*Barium Sulphide, Calcium Sulphide, Corrosive Sublimate Alcoholic Pigment (with caution). Pigmentum Thymol, Sodii Sulphid.* 25 *to* 40%, *Aq. Sol.,* 'X' rays, Electric Needle.

Hay Fever.—Ammonii Chlorid., Anthoxanthum, Arsenic, Belladonna, Calcii Lactas (full doses), Camphor. Grindelia, Ethyl and Diacetyl Morph. hydrochlor., Liq. Ethyl Nitritis. Potass. Iodid., Quinine preps., Terpene hydrate, *Hay Fever Vaccine,* B. Coli Vaccine Autog. (?). Thyroid Feeding (*Standardised Preps.*).

Acid. Salicylic. Pulv., Adrenalin, Bismuth. Co. Pulv., Carbolised Smelling Salts, Compound Asthma Fluid, Vapor, Cocain, Hydroch. Liquor., Douche of Mercuric Iodide, 1 *in* 2,000. *Eucalypti Oleum,* Hydrogen Perox. Nasal Spray, *Menthol, Menthol and Camphor, Nebulæ, Pigmentum Antisepticum, Pimento* and Eucalyp. Snuff, *Pollantin, Pulv. Lobeliæ Comp., Quininæ Collunarium, Stramonium, Stramonium Fumes, Suprarenal Extract (excellent), Terebene.*

Headache, Bilious or Sick.—*Caps. Ol. Elliott.,* Chloro-Sodio-Magnesian Aperient, Colalin, Elixir Gentian. Acid., Euonymin, Guarana, Hydrastis, Iridin, *Liq. and Tabellæ Pepsinæ et Caffeinæ,* Phenacetim, Phenazone, Podophyllin, *Sodii Citras,* Sodii Phosph. Efferves., Sodii Sulph. Efferves., Sodio-Magnes. Sulph. Efferves., Sodio-Mag. Sulph. with Caffeine.

Headache, Congestive or Inflammatory. — Actæa, Colchicum, Ergot, Ammon. Chlorid., Antimony, Hydrarg. Subchlorid., Maricol, Phenazone, Ricini Ol., Salicylates of Sodium, &c., *Sedeff,* Trilactine, Veratri Viridis Tinct.

Headache, Nervous.—Acid Aceto-Salicylic, Acid Hydrobromic, Acid

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***Ointment Introducers** (Rectal, Allingham's) are square or round in shape, of vulcanite. Sir Pearce Gould's has graduation marks on tube. Urethral Ointment Introducers are also supplied.

Hydrocyanic, Actæa, Ammon. Arom. Spt., Arsenic, Auri Bromidum, Belladonna, Bromides, Butyl Chloral, Caffeine, Camphora, Cannabis, Chloralamide, Cimicifugin, *Elix. Acetanilid. Co.*, Elixir Anti-Neuralgicum, *Elixir Caffeinæ*, Ferri Valerianas, Gelsemium, Guarana, *Ibogaine*, Iodo-Caffeine, Iodo-Theobromine, Iron Salts, Kola, Methylene Blue, *Migralgin*, Nitroglycerin, Phenacetin, Phenazone, Pulv. Calc. Glyceroph. et Lac. exsicc., Quininæ Valerianas, *Sedeff*, Sodii Citras, Sodii Sulphocyanid. (?), Solanine, *Theobromine, Lithium Benzoate*, Trilactine Tablets, Trilactine Milk, etc., *Tylcalsin, Tyllithin*, Zinci Lactas, Oxidum and Valerianas.

Nitroglycerin with Strychnine (Tabellæ).—Gowers.

A prescriber's note—per C. D.—If of *dietary origin*, 20 grains of sodium bicarb. with tinctures of gentian and cardamoms will probably have the desired effect. If *due to fatigue*, 10 grains of phenazone with 1 dr. of spt. ammon. arom., and perhaps a little gentian, is indicated. If of *influenzal origin*, 10 grains of sodium salicylate with 6 grains of phenacetin and the same adjuvants will probably act as magic.

Heart.—See **Cardiac Tonics** and **Dropsy, Cardiac,** also Vasodilators.

Hectic Fever.—Acid. Benzoic. and Benzoates, Acid. Salicylic., Acid. Sulph. Aromat., Agaricus albus and Agaricin, Gelsemium, Phenocoll, Picrotoxin, Quinine preps., Salicin, Salicylates.

Hepatic Colic.—*See* **Calculi, Biliary.**

Hernia (*Local use*).—*Intraspinal Injection* of Anæsthetics *prior to operating.*

Herpes, and Zoster.—*Arsenic e.g. Fowler's Solution*, Morphinæ inj. hypod. (for pain), Quinine preps., Salines and Saline Aperients.

Amyli Glycerin., Anodyne Colloid, Carron Oil, (or mixed with *Zinc Oxide Ointment* 3 : 1), Bismuth Oleas, *Cocain preps., Collodium, Hydrarg. Ammon,* Cremor Sicc. preps., *Ung., Hydrarg. Oleat. Ung., Hydrog. Perox., Ichthyol, Menthol pigment or Unguent* (for pain), Perfumed Formosyls, Quinine Ionisation, *Zinci Oleat. Ung., Zinci Ung.*

Hiccough.—Adrenalin Solution, Æther. Spt., Amyl Nitris, Camphora, Capsici Tinct., Chloral, Chlorof. Spt., Extract. Ergotæ Liq., Liq. Ammon. Acet., Morphine preps., Musk, *Ol. Succini*, Pilocarpine Hydroch. Sedeff, Sodii Bicarb., Trilactine, Valerian Tinct.

Hodgkin's Disease.—See **Lymphadenoma.**

Hordeolum.—*Argent. Nit., Belladonnæ Fotus. Hydrarg. c. Morphina Oleat. Iodi Tinct., Ung. Hydrarg. Oxidi Flavi, Ung. Metallorum.*

Hydrarthrosis.—*Allium Scales* to surround joint. Cataplasma Salicyl Co., Scott's Dressing. *See also* ŒDEMA.

Hydrophobia.—Anæsthetics, Amyl Nitris, Cannabis Indica, Chloral, Curara, Hydrogen Peroxide, Hyoscine, Hyoscyamine, Morphine, Nitroglycerin, Nux Vomica, Pelletierine, Physostigma and Physostigmine, Pilocarpine.

Immediate use of Actual or Electric Cautery, or Nitric Acid or Argent. Nit. Solid, or other caustic paste at hand.

Hyperchlorhydria.—Alkalis, Belladonna, see also *Vol. II., Exam. of Stomach Contents, 'Belladonna best to inhibit secretion,' Bismuth Tart. Solub.*, Bismuth, Cerium Oxalate, Glycogen, Nux Vomica (large doses), Ol. Olivæ, Pepsin, Sedeff.

Hyperhidrosis.—*See* **Perspiration, excessive.**

Hypertrichosis.—*See* **Hair to Remove.**

Hypnotics.—*See* **Insomnia.**

Hysteria.—Actæa, Allii Ol. Essent., Amyl Nitris, Asafetida, Auri Bromidum, Auri Chlorid., *Brom-albumen*, Calcium, Magnesium, Manganese and other Bromides, Cannabis Indica, Cypripedin, *Ibogaine*, Iron Salts, *Liq. Antihystericus*, Lupuli Tinct., Nux Vomica, Ol. Succini, Phosphorus, Pulsatilla, Quinine Preps., Sedeff, Spirit Ammon. Arom., Syr. Pilocarpin et Pot. Brom., Strychnine, Sumbul, *Urea Bromine*, Valerian and Valerianates, Validol, Zinc Salts.

Ichthyosis.—*Resorcin* (*q.v.*) and *Salicylic Acid.*

Impetigo.—Remove crusts with Olive Oil or by Boric Starch Poultice, then 10% Ammoniated Mercury Ointment, *Brilliant Green Ointment*, and *see* **Eczema.**

Impotence.—Arsenic, Auri et Sodii Chloridum, Cannabis Indica and Cannabin Tannas, Cantharides, Coca and Cocaine, Damiana, Easton's Syrup, Ferri Perchlorid., *Formates*, Glycerophosphates, Gokhru, Ibogaine *Muirapuama*, Nux Vomica, Phosphorus, *Pilula Potentin Co.*, Piperazina, Sanguinaria, Strychnine, Testicular Extract. *Theobromine Lithium Benzoate*, Yohimbine Zinci Phosphid.

Yohimbine recently to our knowledge caused unpleasant subsequent effects.

Incontinence of Semen.—Arsenic, Auri et Sodii Chloridum, Belladonna, Bromides, Camphor Monobromide, Chloral, Ergota, Ferri Perchlorid., Ferri Phosph. and Ferri Phosph. c. Quin. et Strych. Syrup., Gokhru, Hyoscine, Hyoscyamine, Phenazone, Salix nigra, Saw Palmetto.

Incontinence of Urine.—Ammon Brom., Arsenic, Belladonna, Buchu, Calcii Glycerophosph., Calcii Phosph., Calomel to regulate bowels, Camphor Monobrom., Cantharides, Ergota, Ferri Iodid., Ferri Perchlorid., Gokhru, Hyoscyamus, Lycopodii Tinct., Naphthalin, Nux Vomica, Phenazone, Potass. Cit., Rhus Aromatic Ext. Liq., Liq. Strychninæ (Ringer), *Thyroid Gland* (Standardised Liquor or Tablets).—L. i./09,1245.

Indigestion.—*See* **Dyspepsia.**

Inebriety.—*See* **Alcoholism.**

Infant and Invalid Feeding.—Pasteurised Milk, Dried Milk, Foods A, B and C., Herogen, Pavimol (Emuls., Caps., Tabs.), *Pulv. Calcii Glyceroph. c. Lacte exsicc.*, *Peptonising Powder for humanising milk and Peptonised Milk*, *Trilactine Milk*, *Whey Powder*, *Lactalbumen*, *Banana Flour*, Glaxo, *Goats' Milk*, Sodium Citrate Tablets (and with Sodii Bicarb.). Tablets to add to ordinary milk to increase digestibility, Koumiss, see Chapter 'Nutrimenta,' Accessory Food Factors, etc.

Inflammation.—Acetanilid, Aconite, Antimony, Belladonna, Digitalis, Gelsemium, Granules d'Aconitine, Hydrarg. Subchlorid. and cum Opio, Opium, Phenazone, Quinine, Salicin Veratrina.

Cataplasm Salicyl. Co., Glycerinum Plumbi Subacet., Iodine Ionised.

Influenza.—*Aceto-Salicylic Acid*, Aconite, Acetanilide, Actæa, Æth. Nit. Spt., Ammon. Acet. Liq., Ammoniæ Aromat. Spt., Antimonii Tartras, Belladonna, Camphor. Cinnamates, Cocain. Hydroch. Liquor, *Colloidal Metals*, *Formates*, Ipecac. Co. Pulv., *Iodi Tinct.*, Inhalations of Eucalypti Ol. Menthol, *e.g.*, Ozonic Inhaler (clears the head), Kinectine, Magisal, Musk for heart failure, Menthol and Camphor, Opium and Morphine preps., Phenacetinum Quinine preps., Salicinum (large doses), Salipyrin, Salol, Sodii Salicylas, Tinct. Quinin. Ammon., Tab. Ammon. Quinine Comp., *Influenza B. Vaccine*, also Comb. Cold Vaccine, and Sensitised Infl. B. Vaccine, *Tylcalsin*, *Tyllithin.*

For *sweating of*—Amyl Nit. $\frac{1}{30}$ minim doses internally.

For post influenzal cough, *Lysol Inhalation*, Mist. Apomorph. Co.

A single deep inhalation of *Chloroform* retained for a few seconds allays sensation of tickling in the throat and prevents recurrence in post influenzal bronchial catarrh accompanied by troublesome paroxysmal cough.—A. S. Gubb, L. i./15,882.

Influenza at Bramshot, September to October, 1918, Multiplicity of Treatments. Nothing is specific.—C. E. Cooper-Cole, B.M.J. ii./18,566.

For an ordinary severe case give Aspirin and Dover's Powder, *aa.* 10 grains, as early as possible after customary aperient, and repeat in 6 to 8 hours; follow by a simple diaphoretic. For *headache*, if necessary, Phenacetin 5 grains with Caffeine 2 grains. For foul tongue Sodium Bicarbonate and Sodium Sulpho-carbolate. For *vomiting* reduce feeds and give Tinct. Iodi 1 m. hourly for 6 doses. For *cough*, Syr. Cocillanæ Co., Syr. Codein, or Linctus Terpin et Heroin. For sleeplessness, Bromide or Paraldehyde.—Sir Thos. Horder, L. ii./18,694, 871. See also B.M.J. ii./19,695.

Influenzal Septicæmia, essential feature *B. influenzæ* with *S. pyogenes longus* or a *diplo streptococcus* as secondary organism. This latter organism plays an important rôle in the fatal cases.—A. Abrahams, N. Hallows, and H. French, L. i./19,1 *et seq.*

Epidemiology and Clinical Aspects. A general review, L. i./19,72.

Aetiology of Influenza.—Immunity acquired after 2 or more innoculations with B. Influenzæ.—J. Speares, M.P. i./19,9.

Apparent immunity from Influenza at Christ's Hospital School.—Results of Innoculation. Only one case of Influenza occurred of 633 boys treated.—G. E. Friend, L.i./19,105.

Formalin Spray, 6 drachms of 40% solution to 1¾ pints of water checked Influenza.—A. Wylie, L. i./19,256.

Cinnamon Oil and Formalin destroy or inhibit growth of Influenza B.—F. T. Marchant, L. i./19,392.

Yadil employed with satisfaction and without complications arising.—H. Renney, L. i./19,440.

Complications, Treatment of.—A. J. Eagleton and H. H. Butelier, L.i./19, 560 572.

B. Influenzæ rarely recovered postmortem, pneumococci and streptococci frequently.

Considerable improvement from lumbar puncture after meningeal symptoms of Thiosinamine Salicylate or Thiosinamine-ethyl-iodide after pneumonia for delayed resolution Influenza bacillus cause of epidemic.—Royal Academy of Medicine in Ireland, per M.P. i./19,12.

No particular effect from vaccine.—G. Peacocke, M.P. /19,7.

Media for culture of *B. Influenzæ*.—Blood boiled in Agar, etc.,—A. Fleming, L. i./19,138.

Fumes such as *Nitrogen Peroxide* and *Sulphur Dioxide* are inimical to the Influenza virus. Possible practical application.—A. Gregory, B.M.J. ii./19. 523.

See also PNEUMONIA.

Insanity.—Fresh Brain Extract has been tried. *See also Mania.*

Insect Bites, *vide* **Bites and Stings,** also PARASITES and PEDICULOSIS.

Insomnia.—Acetanilide, Ammon. Bromid., Amyleni Hydras, Antifebrin, Bromal Hydras, Bromidia, *Bromogluten*, *Bromoprotein*, Butyl Chloral, Camphor, Cannabis Indica and Cannabin, Chloral (not now advised), Chloralamide, Chloralose, Chloretone, Chlorobrom, Coca, Codeina, Codeonal, Diallyl-barbituric Acid, *Guttæ Castorei Comp.*, Hop pillows, Hyoscyamine, Hypnal, Hypnone, *Lactucarium*, Liquor Bromo-Chloral Comp., Lupulin, Morphine, Narcophine, Nitroglycerin Tabellæ, Opium, Paraldehyde (*recently intravenously*), Phenazone, Pituitary Extract (?). Potassii Bromid., Quinine at bedtime, Scopolaminæ Hydrobromid., *Sedeff*, Sodii Bromid., Stramonium, Strychnina and its salts, Sulphonal, Trional, Urethane, Valerian, Veronal, and Veronal Sodium.

Intertrigo.—*Acid. Boric. and Ung., Acid. Tannic Glycerin., Calaminæ Lotio, Calcii Carb., Calcis Aqua, Camphor, 'Cremor Sicc.' preps.*, Formosyl, *French Chalk, Fuller's Earth*, Hazel Foam, Iodi Tinct. diluted with 3 times volume with Eau de Cologne, Iodine Colloidal, Liquor Carbonis Detergens diluted with equal vol. or twice volumes of Eau de Cologne or Ichthyol diluted with water 50 or 60 times, *Kaolin, Methylene blue, Oleogen Compounds*, Pellanthum preps., Perfumed Formosyls, Ung. Thorii Oleat, *Vaseline, Zinci Cremor and Ung., Zinci Oleat Pulv, Zinc Salicylas.*

Intestinal Antiseptics.—*See* **Antiseptics.**

Intestinal Worms.—*See* **Worms.**

Iodism.—Acid Sulphanilic. Preps. containing ammonia.

Iritis.—Colchicum, Hydrarg. Perchlorid. and Subchlorid., Iodum, Oil of Gaultheria, Potass. Iod., Pilocarpine, Salicylic Acid.

Atropina cum Vaselin., Atropinæ Sulph. Guttæ and Lamellæ, Belladonna, Duboisine, Dionine, Scopolamine, *Sterules various.*

Itch.—*See* **Scabies.**

Jaundice.—Acid. Citric, Acid. Nitro-Hydroch. Dil., Aloes, Ammon. Chlorid, Benzoates, Elixir Gentianæ Acidum, Calcii Chlorid, Euonymin, Ferri Succinas, Hydrarg. cum Creta, Hydrarg. Subchlor., Hydrastis, Iodoform, Iridin, *Manganese Sulphate*, Pilocarpine, Podophyllin, Salol, Sennæ Co. Mist., Sodii Phosphas and Sodii Phosph. Efferves,. Sodii Salicylas, Sodii Succinas Sodii Sulphas, and Sodii Sulph. Efferves., Stillingia, Taraxacum.

To relieve skin irritation dilute Nitric Acid Lotion or Sodium Bicarbonate Solution, Hazel Foam, *Liquor Carbonis.. Ung. Rusci. Comp.*

Diagnosis of *v.*, Bile in Urine, Vol. II.

JAUNDICE, INFECTIVE. *See* Vol. II.

Jaundice, with special reference to types occurring during the war.—Lettsonian Lectures.—W. H. Willcox, L. i./19,869,929.

Jaundice, recent work on.—Editorial, B.M.J. ii./19,419.

Kala Azar.—Organic Arsenic Comps. *q.v.*, Antimony Oxide, also Antimony Pot. Tart. Injection.

Kidney Permeability Tests.—Methylene Blue, Indigo-Carmine, Phenol-sulphone-phthalein, Phloridzin. *vide* Vol. II.

Thorium-Sodium Citrate as pyelographic medium.

Keloid.—*Formalin Injection, Mist. Hydr. Biniodid.*, Radium, "X" Rays.

Labour.—*See* **Uterus, to Contract.**

Laryngismus Stridulus.—Aconite, Amyl Nitris, Belladonna, Bromides, Chloral, Coninæ Hydrobrom., Emetine, Gelsemium, Piscidia.

Laryngeal Ulcers.—Lactic Acid, also Quinine HCl. Acid, as pigment and nebula

Laryngitis, Acute.—Aconiti Tinct. or Pastil., Ammon. Acetat. Liq., and Ammon. Chlorid., Antimonials, Antipyretics, Calomel, Codeine Jelly, Diacetyl and Ethyl Morphine, Glycaphorm, Linctus (various), *Lichenoids, Melaleuca*, Pulsatilla.

Counter-irritation, fomentations, leeches.—Adrenalin, *Inhalations of Ammon. Chlorid., Sprays of Menthol in Oil, Thymol, Tinct. Benzoin Co., Belladonna and Conium, Juniper*, Æther Acetic.

Laryngitis, Chronic.—Ammon. Chlorid. and Liquorice, Codeine Jelly, Creosote preps., Cubebs, Glycaphorm, Heroin, *Iodine Colloidal, Lichenoids*, Morphine preps., Pautauberge's Solution, Tab. Formalin (to suck), Tar preps., Terebene, Terpin.

Injectio Creosoti or Creosoti Co., Insuffiatio Morphinæ et Bismuth and of Catechu, or Menthol. or Tannin, Oxygen and Alcohol Inhalation, *Pastils of Glyco-gelatin (see list) e.g.*, of Ammon. Brom., *Pigments of Cocaine, Menthol &c. Vapour of Creosote, Eucalyptus Oil, Juniper Oil, Terebene, Thymol, Ol.* Succini Liniment.

Leprosy.—Anacardium, Gurjun Balsam, Chaulmoogræ Ol., Emulsion and Injection, Intramine (?), Tannic Acid, *Guaiacol internally and locally*, Sodium Morrhuate injected, Sodium Chaulmoograte 'A' Pills, and 'C' Sterules, Magnes. Chaulmoograte.

Ammonium Persulphate and Acid Hydrochlor. Nasal Douche. Sulphur burning Inhalation.

Leucocythemia.—Acid. Carbolic (inhaled), *Benzole Capsules.* Arsenical preparations, Cacodylates, Digitalis, Glycerophosphates, Hypophosphites, Iodine, Iron Salts, Liquor Ferri Peptonat., Marrubin, Phosphorus, *Syrupus Iodo-Tannicus*, Syrupus Tann-Iodo Phosphoratus, Syrupus Trium Phosphatum, Zinc Phosphide

Leucorrhœa.—Hæmatoxylin, Iron Salts, Manganese preps., Mineral Acids, Myrrh, Vegetable Tonics, Fæxin Ext.

Abies Canadensis, Acid. Boric. Lotio, Acid. Carbolic. Lotio, Copper, Zinc or Iodine Ionisation (for obstinate discharge), *Alumen, Ammonio-Ferric Alum, Boric Acid in Powder*, Formosyl Pessaries, Kaolin Insufflation, *Hydrastis*, Iodates, Mercuric Chloride, Ovules of Alum or Carbolic Acid, etc. (see list, p. 610), Naphthol, Pond's Tampons, Quinine Hydrochloride, Tannic Acid, *Pessus Quininæ, Potassii Permang., Pulsatila lotion, Sodii Bicarb., and Belladonna (Ringer)*, Sodii Perboras, *Tannin and Alum Injection, Zinci Sulphocarb.*

LEUKÆMIA, *see* ANÆMIA.

Leukoplakia.—Radium.

Lice to kill. *See* **Parasites, Animal.**

Lichen planus.—Acid Phosphoric c. Strych., Acid. Salicyl. Ung.

Liq. Carbonis Deterg. 10 m. to 1 dr. to oz of water or Calam. Lotion See also Eczema.

Liver Abscess *vide* Abscess, Liver.

Locomotor Ataxy.—Acetanilide, Aluminii Chlorid., Argent. Nit., Argent. Oxid., Arsamin, Arsenobenzol and other Arsenicals, Auri Chlorid., Cannabis Indica, *Cerebral and Myelin Tablets together, Chloral Formamide, Colloidal Mercury and Silver*, Ergot, *Hexamethylenetetramine*, Hyoscine HBr., Mercurialised Serum, Mercury Benzoate, Morphine, Morrhuæ Ol., *Nickel Salts*, Nitroglycerin, Keratin, Physostigma, Phenacetin, Phenazone, Phosphorus, Potass. Bromid., Potass. Iodid., *Urea-Bromine, Quinine*, Santonin, Sodii Salicylas, Strychnine (with acid), *'Three Gland' and 'Four Gland' Elixir and Tablets*, Zinc Phosphide.

Chloroform on Lint. Cataphoresis of Cocaine Solution. Radium.

Mercury Inunctions.

Leishmania Affections.—Antimony Ox. inj. and other Antimonials Antim. Pot. Tart. and Arsenicals.

Lumbago.—Actæa, Ammon. Chlor., Atropine, Belladonna, Camphor Monobrom, Capsicum, Cimicifugin, Colchicum, Elixir Acid Salicylic Co., Morphine inj. hypod., Ol. Terebinth, Phenazone, Potass. Iodid., Quinine, Salicylates, Sedeff, Solani Ext. Liq., *Tylcalsin, Tyllithin.* All Purgatives, *e.g.*, Chelsea Pensioner, Guaiacum and Sulphur.

Aconite Liniment, Amyl Salicylate, Amysal, Anserine Mulls Medicated. *Atropinæ Linim, Belladonnæ Linim., Capsici Linim., Chaulmoogrates, Chloroform Liniment*, Heat Rays, *Iodum Oleatum, Iohydrin*, Menthol Linim., *Menthol Plaster, Methysal Balm*, Oleogens of Camphor, Guaiacol, Iodine and Oleogen Salicylicum, *Opii Linim.*, Ung. Iodi Intinctum, *Picis. Empl.*, Ung. Antim. Tart., *Veratrinæ Ung.*, 'X' Rays. Static Electricity.

Lupus.—Amyli Iodid., Arsenic, Aristol, Auri Chlorid., Cacodylates, Gynocard. Ol., *Hydrargyri Biniodidum*, Iodum, Morrhuæ Ol., *Myelocene*, Phosphorus, Quinine preps., Thyroid Gland. Tuberculin Old.

Acid. Chromic. (and Chromic Ions ?) *Acid. Cinnamic, Acid. Hydrochloric, Acid. Lactic., Acid Pyrogallic Emp. and Ung., Airol*, Argenti Oleas, Arsenobenzol, Auri et Pot. Cy. intrav., *Bismuth Iodas*, 'Brass Paste' and preps., *Camphora Salicylata*, Carbonic Snow, Chaulmoogræ Ung., *Cicatricine*, Cupri Oleas, *Ethyl Chloride, Finsen Light*, Formosyl, *Hydrarg. Nitras*, Hydrogen Peroxide, Iodine Ions, *Iodoform*, Iodoform-Ether-Paraffin Injection, Lactic Ions, *Lassar's Paste, Oleata, Oleogen Iodi, Oleogen Ichthyol*, and other *Oleogens, Pitchblende Ointment*, Potassii Permanganas, *Radium, Resorcin*, Thiosinamin, *Tuberculin*, Uranium Oxid. Ung. and Injectio, 'X' Rays, Zinc *Chloridum* Zinc and other Ionisation, *see* Iontophoresis.

Fehling's Solution injected in lupus.—G. N. Meachen, L. i./19,528.

Diathermic Treatment.

Lupus Erythematosus (*Local*).—Acidum Carbonicum, *Hydrarg. Biniodid Myelocene, Finsen Lamp (and with Erythrosin), Radium, Ung. Thorii Oleat., 'X' Rays.*

General Treatment.—Salicin 15 gr. per diem increasing to 30 gr. Besides its action on the toxin it is a cardiac depressant and reduces the hyperæmia in the skin. Quinine internally, also painted on with Tincture of Iodine.

Locally remove adherent scales with soap and spirit lotion, then dry the lesion by Zinc Oxide and Magnesium Carbonate *p. æq.*, or by Calamine Lotion. Then reduce hyperæmia and vascular dilation by Ichthyol Ointment. Formalin Ointment 5 to 10%, to be used with caution. Of mild caustics Oxidised Pyrogallol Ointment 6% or 10%, Resorcin in spirit painted once a week; of radio-therapeutic measures Finsen Light best.

A complete discussion on nature of, treatment, etc.—J. M. H. McLeod, B.M.J. ii./13.313.

Mercuric Chloride in Spirit 1 in 240 alternately with a Zinc, Boric Acid and Bismuth Ointment—more useful than anything.—R. Thomson, Pharmacist, Elgin, N.B.

Lymphadenoma.—Arsenic, 'X' Rays.

Malaria.—*Vide* also AGUE AND FEVERS.—Ammon. Picrate, Antimony Ox. injn. (?), Arrhenal, Galyl and other Arsenicals, *Arsamin*, Arsenic, Arsenobenzol, Cinchonine Acid HCl. (Sir L. Rogers), Eucalyptus Oil, *Methylene Blue, Pulvis. Quinin. Comp., Quinin. Sulph.*, Quinine base (for children, also in preference to a salt when there is hæmoglobinuria), Giemsa's injections, Quin. Hydrobrom. injections, *Laverain Tablets*, Quin. Hydrochlor. internally in preference to Sulphate, Quinoidine, Salicin, Salicylates, Spleen substance, *Tylcalsin, Tyllithin, Tylmarin*, Urea.

Rusot (q.v.) good results in Chronic Malarial Fever of children with hepatic derangement. Warburg's Tincture rarely used in India now.—Ghosh.

Malarial Relapses.—Bold injection treatment with Quinine Acid Hydrochloride combined with Mist. Anticachexia 1 and 2. *See* Quin. Ac. HCl. p. 669 and p. 674.

For recent results of ***experience in the war*** and since, see p. 673.

For ***Antimalarial Measures in England***, *see* p. 675.

B.M.A. Special Clinical Meeting, Discussion, L. i./19,677. See also Annals of Tropical Med. and Parasitology, Vol. XII., Nos. 3 and 4. Abst., L. i./19,756.

Care and Treatment of Cases.—Sir Ronald Ross, L. i./19,780.

MALARIAL COMA.—Quinine-Urethane intravenously, *q.v.*

Malignant Pustule. — Corrosive Sublimate (*q.v.*) applied as dusting powder.

Malignant Tumours.—*See* **Cancer.**

Malta Fever.—*See* **Mediterranean Fever.**

Mammary Abscess.—*See* **Breast, Inflammation of.**

Mania.—Apomorphine, Atropine, Brain Extract Fresh, Bromides, Cannabis Indica, Chloral Hydras Chloroform, Conine, Diacetyl and Ethyl Morphine, Digitalis, Gelsemina, Hyoscine salts, Hyoscyamine Malourea, Morphine preps., Opium preps., Paraldehyde, Syr. Pot. Brom. et Pilocarpin, Sodium Bromide, Sulphonal, Thyroid Gland, Trional.

Marasmus.—Arsenical preps., Conf. Glyceroph. Co., etc. *Emuls. Ol, Morrhuæ c. Lecithin*, Lecithin, Iron preps., *Maltoffin*, Meat preparations *Milk and Glycerophosphates*, Marrubin, *Pavimol*, Thymus.

Measles.—Aconite, and Pastil of, Æther Nit. Spt., Ammon. Acet. Liq. Ammon. Carb., Belladonna Tincture, Calc. Sulphid., *Cinnamon Powder for prophylaxis* (German measles), Ipecacuanha, Potass. Tart. Acidus.

Ol. Eucalypt. all over the body; Carbolic Oil 10% to the tonsils and pharynx. Treatment and prevention.—B.M.J. ii./11,501.

Marcus Beck Laboratory—Work on filterable viruses.—B.M.J. ii./15,19.

Mediterranean Fever.—Intestinal Disinfectants, *e.g.*, Benzonaphthol Salol, Hexamethylenetetramine, Vesalvine 'S' &c. Boil the milk. M. Melitensis Vaccine.

Dried Yeast for peripheral neuritis of.

Melancholia.—Bromides, Brominol, Camphora, *Catha Milk and Glyceroph.* Coca and Cocaine, Cannabis and Cannabin Tannas, Damiana, Elixir Gentianæ Acidum, *Elix. and Emulsio Lecithin*, Musk, Nitroglycerin Tabellæ, Nux Vomica, *Ol. Elliott Caps.*, Opium Tinct., Phosphorus, Pil. Potentin Co., *Syr. Glyceroph. Co.*, Tabellæ Erythrol Nitrate, Valerianates.

Treatment of.—When indigestion and constipation are present it may be necessary to wash the stomach. Calomel as periodical purge, Intestinal Antiseptics, Lactic Acid Bacillus treatment. The patient must not be allowed to starve. It is possible to tell whether a patient is starving or not by smell of breath—when the Carbohydrates are used up there is the production of Acetone. As hypnotics Paraldehyde or Pot. Brom. may be wanted,—the latter has tendency to accumulate. Malourea is also useful. If blood pressure abnormal, Erythrol Nit. Tablets, ½ grain are successful. Dose may be repeated twice daily and slowly increased till two or three grains daily are given. Tinct. Opii, 5 minims (without the patient's knowledge) *t.d.* for 'mental pain,' increasing until definite results are obtained. Melancholia sometimes tends to become chronic, in this Thyroid, an excitant of the nervous system, may be given in fairly large doses. Three Tablets should be given the first day, then 6, 9, 12, 9, 6, 3 daily in succession till a maximum of 60 grains on the fourth day, then decreasing by 3 each day,—patient to be kept strictly in bed and pulse watched. Guard against the danger of suicide.—G. M. Robertson, B.M.J. i./11,800.

Menière's Disease.—Acid. Salicylic., Bromides, Gelsemium, Gelsemine, Pelletierine.

Meningitis.—Aconite, Belladonna, Calomel, *Hexamine* (?), Iodides, Opium, Veratrum.

Lumbar puncture, Antiseptic Injections, Mercurial Injections.

Colloidal Metals, *e.g.*, Platinum in some forms of.

Meningitis, Basic.—Iodoform Vaseline inunction to back of neck.

Menorrhagia.—Acid. Gallic., Acid. Sclerotic., Acid. Sulph. Dil., Beberinæ Sulphas, Bromides, *Brucea Sem.*, Cannabin, Cinnamon. Oil, Digitalis, *Elixir Ergotæ cum Ferro*, Ergota, Ergotin, *Erigeron Oil*, Erodium Cicutarium, Ferro-Alumen, Hamamelis (see note *infra*), Hydrastis, Iron Persalts, *Lecithin Elix. and Emuls.*, *Monsel's Solution*, Pituitary Gland Dry (entire gland), Plumbi Acetas, *Rhus aromatica*, Ruta, Senecio Ext. Liq., Sodii Citras, *Styptol*, Tablets Ergotin, Viburnum, Zinc Ions.

For severe menorrhagia Tinct. Hamamelidis in small doses does no good, but 1 drachm every 2 hours up to 4 ounces in the period are effectual.—W.W.W

Amyl Nitrite.—B.M.J. ii./11,11.

Migraine.—See **Headache Nervous.**

Milk to increase flow.—Acid. Lactic., Galega (Goat's Rue), *Ext. Gossypii Pulv.*, Jaborandi, Malti Ext., Maltolivine, Meat Extracts, Marrubin, Pineal Extract (?), Pituitary Extract (?), *q.v.*, *Potass Cit.*, Thyroid Gland.

During lactation, as soon as milk engorgement shows itself, give *Potassium Citrate*—this helps to make the thick stagnating milk more fluid, *e.g.*, Potassium Citrate 15 grains, Ammonium Carbonate 3 grains, Chloroform Water 2 drachms, water to one ounce. One ounce four-hourly. The Ammonium Carbonate assists in keeping the blood alkaline. The child does not object.—R. Larkin, B.M.J. i./17,765.

Milk, to arrest flow.—Agaricus albus and Agaricin, Belladonna and Atropine, Conium, Ergota, Saline Purgatives, Sodii Iodid.

"Belladonna either internally or applied locally (*e.g.*, Plaster) or Glyc. Bellad. is very efficient, probably acting locally on the mammary gland as on the sweat gland."—H. W.—Physiologists do not agree, *c.f.* Text

Drugs excreted by the milk which hence affects the child.—Anise Oil, Dill Oil, Garlic, Turpentine, Copaiba Oil (and probably all volatile oils), Sulphur Rhubarb, Senna, Jalap, Scammony, Castor Oil, Opium, Iodine, Antimony, Arsenic, Bismuth, Iron, Lead, Mercury, Potassium Iodide. These must be given with care. Copaiba or Turpentine will make the milk so nasty that the child will not take it. The purgatives may cause diarrhœa in the child. Opium should not be given in large doses to the mother. On the other hand, Mercury, Arsenic and Potassium Iodide may be given to the child by being given to the mother.—H.W.

Moles.—Liquid air. Caustics. Liq. Sodii Ethylatis.

Morphine Habit.—Cactus, Camphor, Cocaina, *Combretum*, Dionin, Dormiol, Heroin, Hyoscina, *Mist. Belladonnæ Xanthoxyli and Hyoscyami*, Nitroglycerin, Nux Vomica. Sodii Bicarb., Sodii Bromidum, Sparteinæ Sulphas, Trional.

Mosquitoes, to ward off.—See **Bites and Stings.**

Mumps.—See **Parotitis.**

Muscular Rheumatism or **Myalgia.**—Actæa, Ammon. Chlorid., Anserine Mulls medicated, Atropinæ inj. hypod., Elixir Calcii Chlorid., Calcii Lactat., Cimicifugin, Ibogaine, Iron Salts, Morphinæ inj. hypod., Pot. Iodid., Salicylates, Sedeff.

Belladonnæ Glycerin and Linim., Capsici Empl. and Linim., Camphor Liniment and Compound, Clove Oil, Ether Spray, Gaultheria Ointment, Iodi Linim., Iohydrin, Oleogen Comps., Menthol, Methysal Balm, *Opium (in poultice) Veratrinæ Ung.*—See also LUMBAGO.

Myasthenia Gravis.—Lecithin, Electricity.

Myxœdema.—Arsenic, Iron Salts, Jaborandi, Nitroglycerin, Pilocarpine, Spleen Substance, Strychnine preps., *'Three Gland' and 'Four Gland' Elixir and Tablets,* Thyroid feeding and preps. *(preferably standardised).*

Clinical Lecture on.—Guthrie Rankin, Pr. Feb. 09.204.

Sir. J. Cantlie attributes puffiness in various parts of the body in women to the open chest clothing so much in vogue. He has had excellent results from Four Gland Tablets. Puffiness cured and depression removed.

Nasal Catarrh.—See **Catarrh, Nasal.**

Nævi.—Acid Carbonic, *Acid. Chromic., Acid. Nitric., Actual cautery and vaccination, 'X' rays, Collodium, Sodii Ethylas, Zinci Chlorid. Iodid. and Nitras Liquid Air.* Mesothorium Bromide. *High Frequency Current.*

Nephritis, Chronic.—Aconite, *Basham's Mixture,* Buchu, Copaiba, Digitalis with Caffeine, Erythrol Nitrate, Gokhru, Haustus Imperialis, Hordei Dec., Iodo-Caffeine, Iodo-Theobromine, Jaborandi, *Koumiss,* Lini Infus., Pareira, Pot. Nitris. Pot. Iod., Pulv. Potass. Nitrit. Co. (Brunton), Salt free diet, Santali Ol., Scoparius, *Sod. Salicyl.,* Sodii Sulphocyanidum, Strontii Lactas, Strophanthus preps., *Theobromine Aceto-Salicyl.,* Triticum Repens, Uva Ursi.

Saline Solution injected may prolong life.

"*Firstly Alkaline Salts.*—Acetates, Tartrates, Citrates and Bicarbonates of Sodium, Potassium and Ammonia probably act on the renal epithelium. The slight excess of saline constituents thus produced in the blood stimulates the renal epithelium to excrete them. They draw with them a certain amount of water and the flow is increased. *Secondly, Cardiac Tonics.*—Digitalis acts directly on heart muscle and arteries and increases flow of urine by quickening flow of the blood through the kidney,—especially useful where blood pressure is low or the heart failing before resistance too high for it. *Thirdly, Caffeine, Theobromine and allied drugs.*—These stimulate both heart and renal cells. Theobromine-Sodium Salicylate is more potent than Caffeine. Where condition of the kidneys is the main cause begin with Alkaline Salts."—Herringham --B.M.J. ii. 10.1.

Trench Nephritis.—Sodium Carbonate (cryst.) 10 to 15 grains in water 8 ounces *per os* every hour produced free diuresis. In some cases Nitroglycerin added.—J. Mitchell Clarke, B.M.J. ii/17,239.

War Nephritis. Clinical aspects and pathology. Study of 250 cases. Treatment: Diuretics rarely used and of no value. Diaphoretics used in a few cases, but patients sweat much without drug treatment. Calomel 3 grains at night with saline in the morning was the routine. Rigid milk diet—morphine freely. *Re* the epidemiology of the disease there is much conflicting evidence and theory. The cause is unknown. Possibly infective. —C. A. Sundell and A. T. Nankivell, L. ii/17,414. See also J. Shaw Dunn and J. W. McNee, B.M.J. ii./17,745.

Anatomical condition of lungs, liver, kidneys, etc. in autopsies.—F. C. Davies and R. P. Weldon, L. ii/17, 118.

Filter-passing virus in nephritis. An anaerobic Gram-positive coccus 0.3 to 0.6 μ in size.—Sir J. Rose Bradford and co-workers.—B.M.J. i/19,128.

Nervous Debility, Nervousness.—Acid. Hydrobromic., Acid. Phosph. Dil., Ammon. Bromid., *Arsamin*, and other Arsenic preps., Asafetida, Atropine, Methyl Bromide, Atropine Valerianate, Antiseptics, *e.g.*, Calomel; Auri et Sodii Chlorid., *Bisciniod.*, *Brominol*, *Bromocarpin*, *Bromoprotein*, Calcii Bromidum, Calcii Glycerophosphas (*et. cum Lact. Exsicc.*), Camphora, Cannabis Indica, *Capsul Valerian, Comp.*, Catha Milk and Glyceroph., Coca Wine, *Dormigene*, Droitwich Baths, Easton's Syrup, *Emuls. Ol. Morrh. c. Lecithin*, Ferri Glycerophosphas, Ferric Salts, *Ferri Oxalas*, Guttæ Castorei Co., Hæmoglobin Capsules, etc., Hypophosphites, Ibogaine, Ignatiæ Tinct., Lavand. Co. Tinct., Lecithin (Elix. and Emulsio.), *Lecithin Pulv.*, Liquor Auri et Arsenii Bromidi, Liquor Auri et Hydrarg. Brom., *Liq. Antihystericus*, *Liq. Ferri Mang. Pept. c. Hæmoglobin*, *Liq. Iodo-Ferri Pept.*, Liq. Testicularis, Magnesii Brom., Maltolivin, Manganesii Bromidum, Marrubin, *Ol. Allii Essent.*, Ol. Morrhuæ, *Pavimol*, *Pil. Potentin Co.*, Phosphorus, Potass. Bromid., Quinine preps., Quininæ Valerianas, Salicin, Salicylic Ions, Scutellarin, *Syrup Kolæ Comp.*, Sodii Phosph., *Spt. Meliss. Comp.*, Strychnine, *Strychnine Valerianate*, Sumbul, *Sirop Neurotonique*, Suprarenal Gland, *'Three Gland' and 'Four Gland' Elixir and Tablets*, *Theobromine-Lithium Benzoate*, Trilactine, *Urea Bromine*, Valerian preps., *Valero-bromine*, *Vanadates*, Veronal, Zinci Valerianas

Causes of Neurasthenia.— Excessively low blood pressure. (2) Hypoacidity of the urine. (3) Gouty people, especially those suffering from so-called irregular gout are very liable to metabolic accumulations. (4) Hyperchlorination.—Salt is taken in excess by many. (5) Hyperthyroidism.—Remedies.—Sodium Acid Phosphate, limitation of Chlorides, purgatives.—L. ii./13,1544.

Speech Fright.—*See* **Stage Fright.**

Neuralgia.—Acetanilide, Aconite, Actæa, Æther (injected), Alcohol injections, Ammon. Carb., Ammon. Chlorid., Arsenic, Aspirin, Atropine Valerianate and Salicylate, Belladonna, Bromides, *Bromoprotein*, Butyl Chloral, Caffeine, Cannabis, *Caps. Codein c. Cannabis*, Chloral-Hydras, Cimicifuga, Cinchonine, Cinchonidinæ Sulph., Colchicine, Conium and Coninæ Hydronromid., *Elixir Antineuralgic*, *Elix. Caffiene*, *Elixir Gentian. Acid.*, Exalgin, Gelsemium preps., Hyoscyamine, Iron Salts, Lecithin Elix. and Emuls., Liquor Bromo-Chloral Comp., *Magisal*, Methylene Blue, Monobromacetanilide, Neuralgic Pills, *Neuralgia Powders*, Nitroglycerin, Phenacetin, Phenazone, Phenocoll, Phosphorus, *Pil. Butyl Chloral c. Camph. et Gelsem.*, *Pulv. Morphin. Eff.*, Quinine preps., Quininæ Hydrobrom., Pil. Potentin Co., Salicylates and Salol, *Saloquinine*, *Sedeff*, *Syr. Glyceroph. Co.*, Syr. Hypoph. Co., Syr. Pilocarpin. et Potass. Brom., Theophylline Sodium Acetate, *Theobromine Lithium Benzoate*, *Tylcalsin*, *Tyllithin*, *Urea-Bromine.*

Æthyl Chlorid., *Aconiti Linim.*, *Aconitinæ Ung.*, *Belladonnæ Collodium et Tinct. Ætherea*, *Linim. and cum Chloroform*, *Bromine Ionised*, *Chloral Hydras cum Camphor and cum Menthol*, *Chloroform*, Chloroform by Cataphoresis, *Chloroformum Aconiti*, *Glycopasta Aconiti vel Belladonnæ*, Ung. Iodi Intinctum, Iohydrin, *Menthol*, *Menthol cum Aconitina*, *Menthol Linim.*, *Menthol Plaster*, *Methysal Balm*, *Morphinæ Oleat.*, *Oleanodyne*, Oleogen Camphor, and others, *Opii Linim.*, *Quinine Ionised*, Radium, Salicylic Ions, Thorium. *Veratrinæ Ung.* *All Anodyne Liniments.*

Neuritis.—Arsenical preps., Iodides, Mercurials, Salicylates, Sedatives—Nitroglycerin, Phenazone, Static Electricity, Interrupted current.

Assist reparation of damaged nerves anatomically and physiologically. Phosphorus in form of Glycerophosphates, Lecithin and Cod Liver Oil useful.—B.M.J.E. ii./10,4.

Brachial Neuritis. —For pain especially when associated with rheumatism a mixture of Antipyrin, Sodium Salicylate and Caffeine Citrate For an ateriosclerotic case Nux Vomica and Potassium Iodide. Aspirin also useful in a mild case.—Howell, Pr.

Hydrochloric Acid (q.v.) applied locally.

Neuritis. Retrobulbar.—*Retinal Extract.*

Neurasthenia.—*See* **Nervous Debility.**

Night Sweats.—Acid. Camphoric., Acid. Gallic., Acid. Hypophosph. and Hypophosphites, Acid. Sulph. Aromat., Agaricus albus and Agaricin, Atropine and inj. hypod., Atropine Methyl-bromide, Belladonna, Calcii Chlorid., Codeine, Coto and Cotoin, Guaiacol Carb., Homatropine, Hyoscinæ Hydrobrom., Hypophosphites, Ipecac. Co. Pulv., Iron Salts, Picrotoxin, Quinine preps., Strychnine, *Urea Bromine*, Zinci Oxidum. **Sweats of phthisis.**—Thallium Acetate was tried.

Nipples, Fissures of, and Sore.—*See* **Fissures of Nipples.**

Nits.—*See* **Parasites, Animal.**

Nocturnal Emissions.—*See* **Incontinence.**

Nose Bleeding.—*See* **Epistaxis.**

Nymphomania and Satyriasis.—Bromides, Camphor, Conium, Hyoscine Tabaci Folia.

Nystagmus.—Formic Acid.

Obesity.—Alkalis and Alkaline Carbonates, *Belladonna*, Fucus Vesiculosis, *Iodoprotein Tabs*, Iodum, Potassii Iodidum, Potass. Permang., Saccharin instead of sugar, Sassafras Ol. (?), Sodii Mag. Sulph. Efferves., Thyroid gland. Also Aperient Waters, *q.v.*

Œdema.—*Calcii Lactas* (of feet), *Calcii Chlorid.*, Theophylline Sodium Acetate.

Allium Scales, *Cataplasm Salicyl. Co. Antiphlogistine*, *Linimentum Pot. Iodid. cum Sapone*, Iohydrin, Mag. Sulph. Solution, Perfumed Formosyls, *Ung. Hydrarg. Co.* (of Ankles.)

Ophthalmia.—*See* **Conjunctivitis.**

Ophthalmia, Gonorrhœal. (*Local use.*)—*Argyrol*, *Colloidal Silver Solution*, *Crede's Ointment*, *Ichthargan.*

Ophthalmia Tarsi. (*Local use.*)—*Acid. Boric. Lotio and Ung.*, *Glycerini, Plumbi Subacetatis Ung.*, *Copper Sulphate*, *Hydrarg. Oxid. Flav. Ung.*, *Iodoform Ung.*, *Lysoform*, *Sphagnol.*

Sympathetic ophthalmia thought to be a protozoal disease—Salvarsan did good.—B.M.J. i./11,1426.

Orchitis.—Acetanilide, Aconite, Antimonials, *Iodoprotein Tabs.*, Pot. Iod., Phytolacca. All saline aperients.

Belladonna Glyc. et Ung., *Guaiacol*, *Iodi Tinct.*, *Oleosa and Ung.*, Mag. Sulph. Solution, *Mercurial Plaster*, Methysal Balm.

Oriental Sore.—Carbon Dioxide Snow

Otitis and Otorrhœa.—Acid. Sulphanilic., Aconite, Antimonials, *Glucose, Solution, swab with*, Iodides, Phosphorus, Saline aperients, Sodii Sulphanilas *Pneumococcal Vaccine.*

Aurinaria, see List.

Acid. Boric., *Acid. Chromic*, *Acid. Tannic*, *Alum Insufflatio*, *Alum and Bismuth Insufflatio T.H.*, *Argenti Nitras and Bismuth Insuffl. T.H.*, *Calendula*, *Calomel*, *Carbonis Detergens Liq.* (*as Lotion*), Collosol Ag. and Hg., *Cyllin. Ferri Perchlor.*, *Glycerin.* Hydrogen Peroxide (and Borated), *Ichthyol*, Iodates, *Iodi Tinct.*, *Iodoform Wool and Insufflation with Bismuth T.H.*, *Lysoform*, Microcidine, *Naphthol*, *Perfumed Formosyls* (*diluted*), *Potass. Permang.*, Pyoktanin, *Resorcin*, *Salicylic Acid*, *Thymol*, *Turpentine*, Xeroform, *Zinc Chloride.*

Chronic ear suppuration treated by B.I.P.P.—F. Stoker, L. ii./19,200.

Ovarian Pain.—Ammonii Chlorid., Bromides, Castor. Tinct., Morphine preps., Phenazonum, Pulsatilla, Sumbul Tinct.

Oxaluria.—Eliminate from diet vegetables containing most Oxalate, *viz.*, rhubarb, spinach and tea, at the same time attempt to influence proportions of the bases present in the urine by cutting off foods rich in Calcium such as milk and eggs, and by prescribing such as are rich in Magnesium and at the same time poor in Oxalic Acid, such as peas, beans and coffee, and Oxalate-free foods as all kinds of meat.—A. E. Garrod, B.M.J. i./11,1417.

Ozæna.—(*Local use.*)—Acetozone Inhalant, *Acid. Boric. Lot. and Ung.*, *Acid Carbolic. Buginarium*, *Aldehydi Vapor*, *Alumen*, *Alumin. Acet. Liq.*, *Aristol*, *Creosoti Vapor*, *Cupri Sulph. Buginarium*, *Eucalypti Globuli Infus. and Tinctura*, *Finsen Light*, Glucose Solution as swab, *Hydrogen Peroxide* (and Borated), Iodates, *Iodoformi Buginarium*, *Iodoformi Ung.*, *Lysoform*, *Menthol spray and pigment*, Nebula Formaldehydi, *Perfumed Formosyls* (*diluted*), *Potass. Permangan. Lotio*, *Sanitas* (*toilet*), *Sodii Chlorinat. Liq. Sodii Chlorid.*, *Thymaglycine*, *Thymol Lotio*, *Zinci Sulphocarb.*, Zinc Chloride Spray, *Zinci Sulphas*, see *Buginaria*, Ozæna Vaccine. Zinc Ions.

Paraffin high melting injected into nasal septum.

Palpitation.—Aconite, Bromides, Camphora, Cannabis, Cimicifuga Convallaria, Digitalis, *Tabellæ Digitalini et Nitroglyc.*, *Ibogaine*, Valerianates.—See remedies for Dyspepsia.

Pancreatitis.—Pancreatin Stearettes before or instead of operation.

Paralysis Agitans.—Chloral, *Formates*, Hyoscina, Hyoscyamus, Hypophosphites, Iron Salts, Parathyroid preps., Phosphorus, Physostigma, Strychnine, Sparteine.

Paralysis Bulbar.—Sodium, Lithium, Salicylic or Iodine Ions.

Paralysis, Diphtheritic.—Ferri Iodid. and other Iron Salts, Nux Vomica, Pepsin, Strychninæ inj. hypod.

Paralysis, Infantile.—Thymus Gland.

Paralytic Distension of Intestines.—*Pituitary Ext. Liq. (posterior lobe).*

Paralysis, Hemiplegia.—Arsenicals, Ergota, Iron Salts, Mercurialised Serum, Nux Vomica, Phosphorus, Physostigma and Physostigmine.

Paralysis, Paraplegia.—*Arsenic Comps. Organic, e.g., Arsamin*, Arsenobenzol, Galyl, Neo-Salvarsan, Ergota, Hypophosphites of Iron, and other bases, Mercurialised Serum, Phosphorus, Physostigma and Physostigmine Strychnine.

Parasites, Animal, on Skin. (*Local use.*)—Acetum Cevadillæ, Anserine Mulls Medicated, *Benzol*, Chloroform, Cresol Soap (S. M. Copeman), *see* p. 36, *Hydrarg. Ammon Ung*, *Hydrarg. Oleat.*, *Hydrarg. Oleas c. Sulphure*, Lefroy's Petroleum Emulsion, *see* p. 628, *Hydrarg. Perchlorid*, *Lysoform, Lotio and Ung.*, Iodates, *Lotio Hydrarg. Acetic*, Lotio Parasiticidus, N.C.I., *see* p. 553, *Naphthalin Ung.*, *Naphthol Ung.*, *Ol. Cajuput*, *Ol. Sassafras*, Paraffin Liq. (friction with), Phenoloid Disinfectant—diluted, Perfumed Formosyls, *Pyrethri Flor. Tinct.*, *Sapo Viridis*, Stanni Oleas, *Staphisagria Oleum or Ung. Sulphur Baths, Lotion, and Ung.*, *Sulphurated Lime Lotion*, *Oleatum Hydrarg. cum Sulphure*, *Styrax.*

Clothes Louse.

Soak undervests in 1% Naphthalene and Sulphur in Benzol or Petrol. *See* Naphthalene.

Immerse in *gasoline, petrol or paraffin*, or scald the clothes.—From a pamphlet by B. F. Cummings, issued by the British Museum (Natural History) Trustees.

Soft Soap Solution 20% with ½% Lysol lathered onto the body and rubbed into seams of clothing.

30% *Borax* in powdered *black hellebore root* stated to prevent re-infection.—P. S. Lellan, B.M.J. i./15,474.

Sulphur is thought to be no good (but found effective.—B.M.J. i./15,395.) Mercurial ointment also ineffective. Petrol thought to be best for emergency use.—J. P. Kinloch, B.M.J. i./16,789.

Essential Oils (*e.g.* Wintergreen) only drive away lice. After long exposure to vapour may kill; they do not kill the eggs. Lice are *killed* by Cresol, Powder 3% (Formalin is inactive), Sulphurous Acid, Carbon Bisulphide, Carbon Tetrachloride. Sulphur dioxide from burning Sulphur in a stove best for rooms.—German work per C.D., Nov. 27, 1915.

Perfumes found to repel.—L. i./15,1306.

Ammoniated Mercury 2, Zinc Oxide 1, Magnesium Silicate (French Chalk) 1 applied on a lint pad or dusted on.

Does not stain the clothes. Mercury not found in the saliva during treatment. Does not produce dermatitis. Active against other organisms also.—Langford Moore, L. i./15,529. Experimentally not found suitable.—J. P. Kinloch, B.M.J. i./16,790.

Formaldehyde may kill lice in clothes, produced either by treating ordinary Formalin Solution with Potash Permanganate—2 kilos it is stated will decompose 5 litres of Formalin—or the Formaldehyde may be simply driven off by heat. The clothes are arranged in a chamber connected by a delivery tube with the generator. From 5 to 10 minutes' exposure suffices to kill lice and their ova.—P.J. i./16,371. We doubt whether this is much use.—German work says 'Formalin inactive.' Vide above.

Westoran and *Westropol* have been advocated.

N.C.I. (*q.v.*) has been much used, also *Vermijelli.*

The most active substance known will not protect a person for more than two or three days. Vapour of *Carbon Bisulphide* recommended for killing lice and nits in clothes and rooms. For these expose in a thin layer in flat dishes allowing 100 Cc. per cubic metre and allow to act for 12 hours. Paradichlor-Benzol is active, but causes burns on the skin. Clove oil also, but too expensive.—B.M.J. i./16,734.

The best *powder* is Naphthaline. Menthol is preferable in odor. It repels mosquitoes and fleas as well. For ***Bed Bugs*** Kerosene is best (Iodoform has no deleterious action on these). Pyrethrum is more powerful on bed bugs than on lice.—A. Castellani and T. W. Jackson, L. i./16,39.

Cytisine from Gorse.—Compared with Naphthaline, Cresylic Acid and others. It might be toxic to impregnate garments. Iodoform does not improve effect of Naphthaline. An emulsion of equal parts of common Cresol and Soap used in 5% solution in warm water is best, but might irritate the skin.—A. Bacot, B.M.J. ii./16,447. See also B.M.J. ii./19,603.

An exposure at 60° C. for 10 minutes is lethal to lice and their eggs. *Wax Thermometer* employed. Ampoules containing wax with this and somewhat higher melting point and glass beads would be useful in hot air sterilising chambers.—E. Emrys-Roberts, B.M.J. i./18,509.

See also **Pediculosis Capitis** *infra.*

Parasites, Intestinal.—*See* **Worms.**

Parasites, Vegetable, on Skin. (*Local use.*)—Acet. Cevadillæ, *Acid. Boric., Acid. Carbolic, Acid. Chrysophanic Ung., Acid. Sulphuros*, Argent Oleas, Cupri Oleat. Ung. (*for favus*), *Formol, Hydrarg. Oleat.*, Hydrogen Perox., Lotio Parasiticidus, *Lysoform*, Perfumed Formosyls, Petroleum of Commerce (favus) (B.M.J. i./09,1297), *Phosphor. Ol., Picrotoxin Pigment., Pyrogallol Sassafras Oil, Sodii Hyposulphit. Lotio., Thymol Ung., Ung. Thorii Oleat.* 'X' Rays.

Paratyphoid, *see* TYPHOID.

Paresis.—Hydrarg. Perchlor. has been used.

Parotitis (Mumps).—Aconite, Aperients, Iodides, Phenazone, Salicylates, Salines.

Glycerin of Belladonna to neck, Iodine Ointments and Liniments, Methysal Balm, Thorium Oleate.

Pediculosis Capitis (Lousiness).—*See also* Parasites, Animal, *antea.*

Head Lice.—Use 2% Phenol. Kills nits also. If necessary cut the hair short and apply Kerosene, Petrol, Paraffin, Turpentine (*c.f.* Sapo Olei Tereb.), Benzene or Xylol—not to be allowed to remain long on the scalp.—B. F. Cummings (British Museum).

Acetic Acid 10% dissolves the substance by which the nit is attached to the hair. Kerosene and Olive Oil equal parts left on for 24 hours and then wash off. 5% Mercuric Oleate in ether is effective.—P. S. Lelean, B.M.J. i./15,474.

For female children where the hair is long, thoroughly soak the hair in 1 in 40 Phenol Solution. It is not desirable for children under five. Patient lies on a bed with head over the edge,—the hair hangs over a basin. Sluicing with the Solution is continued for ten minutes, particularly over the ears. The hair is then wrapped in a flannel like a turban. Stated to be eminently satisfactory.—A. Whitfield, L. ii./12,1648.

Pediculi,—to kill in room, *i.e.*, after infection,—Nitrous fumes or Sulphuric Acid as suggested under Malaria, Vol. II.

Pericarditis.—Aconite, Caffeine, Digitalis, Levurine, Lotio Quassiæ, Mercury preps., Nuclein, Opiates and Musk (to relieve pain), Potass. and Sodii Iodid., Salicylates

Belladonna Emp. and Liniment. Leeches, Ice, Blisters.

Peritonitis.—Acetanilide, Aconite, Camphor in Oil injection, *Colloidal Metals*, Digitalis, Hydrarg. Subchlorid. cum Opio, Hyoscyamus, *Mercury and Chalk with Iodoform*, Opium, Opium and Belladonna, Phenazone, Tuberculin, Veratrum Viride.

Turpentine or Belladonna, Stupes or Poppy-head fomentations. For Pelvic,—Collargol, Suppository.

Peritonitis Pneumococcic.—See L. i./06,1591.

Perspiration, Excessive.—Abies Canadensis, Acid. Agaric., Acid. Phosph. Dil. Acid. Sulph. Aromat., Atropine and inj. hypod., Atropine Methyl-bromide, Belladonna, Ergota, Jaborandi, Pilocarpine, Picrotoxin, Quinine preps.

Acid Chromic (of feet), *Amyli Pulv., Diachyli Ung., Emol, Formol, Kaolin, Lysoform, Naphthol sol. in Alc. and Glycerin, Tannin, Zinci, Oleat, Pulv. and cum Thymol., Zinci Oxid., Zinc Carbonate, Zinc Borate, Pasta Zinci et Amyl.* '*X*' Rays (see Radiology, also B.M.J. i./10,60).

Perspiration, Fetid.—Mineral Acid and Vegetable Acids (Calcii Sulphas, as in Contrexeville Water), Sulphur, (of feet), and Tonics.

Acid. Boric Lotio and Ung., Acid. Carbolic. Lotio and Ung., Acid. Salicylic. Pulv. cum Talco, Aluminii Acet. Lotio, Atropine or Belladonna Linim., Borax, Diachyli Ung., Glycerini Plumbi Subacet. Ung., Iodates, *Lysoform, Tannoform,* Ung. Sulph. Zinc. et Kaolin (of feet), *Zinci Oleat. cum Thymol*

Pertussis—*See* **Whooping Cough.**

Petit Mal.—*See* **Epilepsy.**

Pharyngitis. (*Local use.*)—Adrenol, *Phenazone Nebula* 3%, *Ung. or Nebula of Menthol and Boric Acid to nostrils, Hyd. Perchlor. Gargar., Inhalation of Friar's Balsam, Iodine Vapour, Potassium Chlorate Gargle, Sulphurous or Arsenical Waters internally and as Spray,* Silver Nitrate and Zinc Chloride Pigments, *Counter-irritation to neck,* Tablets of Formalin (to suck), Zinc Ions.

Hyd. Subchlor. 1/6 grain on the tongue every ½ hour for 12 to 18 hours.—B.M.J. ii./12,1249.

Phlebitis.—Warm compresses and rest the limb with it raised.

Phosphaturia.—Has nothing to do with increased output of Phosphoric Acid, indeed this would prevent the deposit of earthy phosphates,—the urine is alkaline and turbid owing to the deposit. Acid Sodium Phosphate and general tonic treatment required.—B.M.J. i./11,1417.

Phthisis.—Acid. Camphoric., Acid. Cinnamic., *Acid. Coumaricum,* Acid Fluoric and Ammonium Fluoride inhalations, Acid. Hypophosph. and Hypophosphites, Acid. Lactic. and Lactates, *Acid. Malic.* Acid Sulphuros, Allium preparations, *Allmatein* (Intestinal), Arrhenal, Arsenic (and organic arsenic compounds, *e.g.*, Arsamin), Atropine (to obviate night sweats and for hæmorrhage), *Auri Cyanidum,* Benzoates, '*Brass Paste*' (local), Cacodylates, Calcii Chlorid., Calcii Iodid. Elixir, Calcii Hypophosph. and Phosph., Calcii Sulphid., *Cholesterin,* Chondrin, *Cinnaldehyde Capsules, Cinnamic Salts and Injection,* Codeine (for night cough), Creosoti Elixir, Creosoti Carbonas Creosoti Valerianas, Creosotum, Crotalin, *Cupri Acetas, Durant's Injection, Elixir Arsamin,* Elixir Creosoti, Elix. Hæmoglobin c. Lecithin, *Elixir Sodii Formatis,* Emuls. Ol. Morrhuæ et Hypophosphitum, Emuls. Ol. Morrhuæ c. Lecithin, Emulsio Paraff. c. Pancreatin, Emulsio Petrolei, Ethyl and Diacetyl Morphine, Eusol, Ferrated Cod Liver Oil Emulsion, Ferri perchlor., *Filix Mas,* Formaldehyde Inhalant, Gaduol, Glycerophosphates, Guaiacol, Camphoras, Carbonas, Cinnamas, or Phosphas, Guaiacol-Salol, Guttæ Cinnam. Co., Hyd. Succinid., Ichthyol Capsules, *Inj. Cacodyl. Co.,* Intramine (?), Iodoform and Creosote Oil, Iodoform and Benzoyl Chloride Iodoform Glyc. Injection (Tuberculous Abscess), Iodine, 'Nascent,' Iodoform in Ethereal Injection intravenously (phthisis), Iodoform and Menthol Inj., Liq. Iodi Fort (to swab out sinuses), Iodi Tinct. (as tonic), *Iodine Injection* (*Durant*), *Lachnanthes, Lecithin, Liq. Ferri Mang. Pept. c. Hæmoglobin,* Iron Salts, Lymph Extract, Maltolivine, Marrubin, *Mistura Creosoti Co., Mist. Guaiacol c. Quin.,* Mist. Sodii Iodid. Composita, Muthu's Inhalant, Mutton Bird Oil, Naphthol-Camphor (inserted in joints), *Normal Horse Serum,* Nebula Formaldehydi, Oleum Morrhuæ, Oleum Morrhuæ c. Creosoto, Ol. Olivæ cum Acido, Oleic, Ovolecithin, Oxygen, *Palladium Chloride,* Pancreatin, Paratoxine, Pavimol, Pepsin, Phenol, Sodii Sulpho-Ricinas, Pil. von Niemeyer (for fever), Piscidia, Pot. Bichrom. Quinine preps., *Quinine Arrhenalate, Radium,* Resorcin (Laryngeal), Salicin, Sirop Neurotonique, Sodii Cresotinas, *Sodii Fluoridum,* Sodii Hypophosp., Sodium Morrhuate Injected, Spleen Substance, *Strontii Cinnamas,* Strych. Cacodylas, Sugar Feeding, Suprarenal Gland, *Syr. Iodo-Tannic, Thorium Comps., Tiodine,* Tuberculin 'M' and other Tuberculins, *q.v.*, Trilactine (for intestinal tuberculosis), Trypsin, *Tylmarin,* Tylmarin-Quinine, Tylmarin-Sodium, Oxygen injection (tuberculous peritonitis), Ung. Acid. Salicyl. Terebinth., *Urea, Vanadates,* Vapor Creosoti Co., Vapor Guaiacol Compositus, Verbascum Thapsus, Yeast Preparations. For *Hæmorrhage* of Amyl Nitrite Capsules.

Precipitation of Mercuric Iodide in the tissues, v. p. 457.

Remineralisation,—increasing the ratio of inorganic residue of the urine to the total residue (normal 30 to 32%), which is indicated in predisposed individuals by giving fresh powdered bone, Magnesium Carbonate, and a little lactose or sugar.—L ii./13,1260

Artificial pneumo-thorax as a useful treatment in pulmonary tuberculosis.—Pr. Jan. 13,129. See also our page 616.

Tuberculous Glands.—Acriflavine, *Radium*, *Guaiacol*. *See also* Phthisis.

Tuberculous Joints.—Zinc Chlor. Solution, Iodised Phenol.

For Diagnosis—Calmette's Ophthalmic Reaction, Ericolin, Von Pirquet's Cuti Reaction, Escherich's Modification, Bandelier and Ropke's Method, Rhino-Reaction, Morland's Quanti Reaction, De Carle Woodcock's Method, 'X' Rays.

Piles.—*See* **Hæmorrhoids.**

Pityriasis.—*Acid Boric. Lotio. and Ung., Acid Chrysophanic Ung., Boracis Glycerin. and Lotio, Chaulmoogræ Ung., Glycerini Plumb. Subacet. Ung., Huile de Cade, Lotio Resorcini, Picis Ung.*, Perfumed Formosyls.

Plague, The.—Acid. Carbolic, Antitoxic Serums of Haffkine and Yersin, Adrenalin, *Arsenic Comps. Organic*, *Strychnine*. As prophylactic, Pil. Quin. Ipecac. and Camph., also Neem Fumigation.

Pleurisy.—Aconite, Ammon. Acet. Liquor, Antimony, Apocynum cannabinum (for pleuritic effusion), Bryonia, *Colloidal Metals*, Jaborandi, Morphine preps., Potass. Iodid., Quinine preps., Sodii Salicylas, Sterilised Paraffin, Veratrum.

Adrenalin, Blisters, Cataplasm Salicylic. Co., Iodates by injection for empyema, Salicylic Ions, *Thermofuge, Ung. Hydrarg.*

In pleurisy during acute stage *Sodium Salicylate* usually the best drug, and the more febrile the patient the greater the indication for it. 10 to 20 grains every four hours. Add *Tinctura Chlorof. Co.* (B.P., 1885) 10 minims to each dose to make it more agreeable. Headache may be relieved by an occasional dose of 5 grains of Phenacetin and 2 of Caffeine. When the temperature has fallen to nearly normal and process of absorption apparently proceeding, give *Pot. Iod.* 5 grains and *Sal Volatile* 20 minims, with *Quinine* 2 grains after food, or if patient anæmic Syr. Fe Iodid. in place of the Pot. Iod. mixture. If the urine be small in quantity and high coloured give a diuretic, *e.g.*, *Tinct. Digitalis*, 5 to 10 minims, *Pot. Iod.* 6 grains, *Pot. Acet.* 15 grains, *Spirit of Nitrous Ether* ½ drachm, *Aq. Chlorof. q.s., t.d.s.* Keep bowels open.

During convalesence absorption of the fluid stimulated by painting the side with Tinct. Iodi diluted with an equal quantity of water. The Iodine should be painted all over the dull area of the chest daily. A half jacket of flannel or gamgee tissue to be worn continuously, becoming impregnated with the Iodine. If there be any apparent check in the clearing up of the exudation, blister (6 by 4 inches) may be tried as counter-irritant, should be left on for 10 or 12 hours. Vesicle that forms should not be cut—dress with Boric Acid Ointment.—Pr. Oct. '10, p. 477.

Pleuritic Effusion (Recurrent).—Intra-pleural Injection of Formalised Glycerin has been practised. *See* p. 125.

Pleurodynia.—*See* **Myalgia.**

Pneumonia.—Acid. Salicylic, Aconite, Ammon. Carb., Ammonii Citras and Chlorid., Aspirin, Belladonna, Caffeine, *Calcii Chlorid.*, *Camphor 'Sterule,'* Chloral and Digitalis (and with Nitroglycerin), *Colloidal Metals*, Creosoti carbonas, *Mist. Creosoti et Potass. Iodid.* (almost specific.—B.M.J. i./15,870), Digitalis *Ethyl Hydrocupreine HCl.*, *Ferri Perchlor.*, Guaiacol, Hyoscyamus, Hypophosphites, Liquor Ferri Acetatis, Normal Saline Solution, Ol. Allii Essent., Phenacetin, Phenazone, Pilocarpine, Platinum Colloidal (?), Potassium Nitrate and Salt-free diet, Quinine preps. (given early almost specific, see p. 675), Salines, Sodii Citras (30 to 40 grains every 2 hours), *Strychnine*, Veratrum Viride, *Antipneumococcic Serum*, *Saline transfusion*, Strychnine Arsenate.

Pneumococcal Vaccine and Sensitised Pneumo Vaccine, *Cataplasm Salicyl. Co.*, *Ice Bags*, *Oxygen (and with Alcohol)*, *Inhalation*.

Notes.—Paraldehyde (for the insomnia).—L. i./07,808. Eucalyptus Oil—Saturated atmosphere. Large doses of Solution of Ammonium Citrate in six doses at one hour's interval, and subsequently a few doses at two hours' interval, and then at intervals of four hours.—B.M.J i./08,716.

Success with 3 grains of Calomel, strips of blister at intervals of about one inch, linseed poultice above, and mixture containing Potassium Iodide 4 grains, Potassium Citrate 10 grains, Solution of Ammonium Citrate ½ drachm in ½ ounce every four hours.—L.i. /09,160.

Pneumonia, heart failure in.—Calcii Chlorid. *Camphor Injn.* (*Curschmann's*).

Strophanthus, Alcohol and Strychnine for the heart)

Opium and preps., and Alcohol should be avoided.

Pneumonia, Treatment of.—Importance of earliest possible discovery of the local lesion. Persistent local reduction of temperature by two ice-bags so placed as to include between them the inflamed area. The range of temperature enjoyed by the pneumococci is bounded by 28° on the one hand (below which no growth takes place) and 42° C. on the other. The rationale of such clinical treatment has been conclusively supported by bacteriological investigation.

The size of the right auricle must be carefully ascertained by light percussion in the fourth right intercostal space. In an early stage of pneumonia an increased extent of the normal finger breadth of dullness soon becomes perceptible. If it amounts to more than a finger breadth and a half and if some dulness can be detected also in the third right space close to the sternum it is generally wise to relieve the right heart by the use of leeches before applying the ice-bags. Keep legs and feet of patient warm and use clinical thermometer frequently. Circumstances in pneumonia do not invariably admit of antiseptic inhalations, but at the earliest stages of the disease this causes no difficulty, and at a later stage the acute dyspnœa can be generally relieved by using leeches. A severe case is reported where treatment on these lines using *Vapor Creosoti Co.*, *v.*p. 372 as employed in tuberculosis was successful. Vaccine Therapy should be added.—L. i./11,492.

Leeches in Acute Pneumonia.—Apply two or at most three leeches over the consolidated area, at the moment when the congestion approaches its height, allowing them to drop off in their own time, and then keeping up warm fomentations for 35 minutes afterwards. If necessary when leeching does not give relief Morphia may be given in addition. In the case of children of tender age great caution must be used in checking the bleeding.

With the exception of symptomatic treatment, as Chloralamide for sleeplessness, Aspirin if the pneumonia was thought to be influenzal in origin, and Digitalis and Alcohol subsequent to the bleeding, nothing calls for mention. This method of leeching has given excellent results.—A. G. Reid, Pr. Feb 1911. p. 293.

Cardiac stimulants.—*Strychnine and Oxygen* combined with blood letting, or *Oxygen bubbled through Absolute Alcohol* in an ordinary chemical wash bottle—it slows and strengthens a rapid feeble pulse, improves its force and volume, and causes considerable rise in blood pressure.

In lobar pneumonia in children a refrigerant mixture such as *Potassium Citrate*, one grain to each year of the child's age up to four, or *Liquor Ammoniæ Acetatis* 15 minims at one year up to one drachm at four, *with Tincture of Aconite* $\frac{1}{4}$ minim at six months to one drop at three or four years. Stimulants not as a rule required. In broncho-pneumonia stimulants essential in many cases. In cyanosis Nitroglycerin $\frac{1}{100}$ grain to a one year old child may be of value, and in extremely shallow respiration *Atropine* $\frac{1}{100}$ *grain* for the same age. Merck's Archives, Mar. 1911, per Pres., June 1911, 163.

Pneumonia kills more of His Majesty's subjects than any other disease in this country except tuberculosis. It is a preventable disease. In prevention increase the resisting power of the individual. The air should be kept moving and the drier the better. A case of bronchitis almost drowned in his own secretion was rapidly cured by raising the temperature of the bedroom and drying the atmosphere.

Combined Cold, also Pneumo Vaccine in early stages.

A case pulled through by shouting to patient to keep breathing and free use of Atropine, with Vaccine

A good leucocytosis in the early stage is a favourable omen. When defective the old remedy—a large blister, may be valuable, *e.g.*, Liquor Epispasticus freely painted on the back. Febrifuge drugs will only mask symptoms. In plethoric patients with laboured respiration venesection and removal of 10 oz. of blood from the arm may be life saving. In treatment the coal tar products are injurious. Give Lime Salts, avoid acid Mixtures at commencement, discard Quinine and Ammonium Carbonate. Examine the urine for Calcium content. If Calcium deficient and albumin present both fixed and free Calcium Salts are deficient in the blood. Give Glycerophosphate, Lactate or Citrate of Lime. Pituitary Extract 1 Cc. hypodermically if blood pressure low and heart dilated.—Sir J. Barr, B.M.J. i./14.69.

Potassium Iodide 4 grains, Potassium Citrate 10 grains, Solution of Ammonium Citrate $\frac{1}{2}$ oz., Water to one ounce—every four hours. Dr. Crowly's treatment for pneumonia.—Facile princeps among the so-called specifics.—J. A. W. Pareira, L. ii./15,94.

Creosote rubbed into the axilla has been advised. Adrenalin to raise blood pressure—small doses every hour.

Broncho-pneumonia treated by Iodine intravenously. 20 to 30 minims of Iodine Tincture diluted with 9 Cc. of N. Saline. Success.—D. M. Baillie, L. i./19,423.

See also INFLUENZA.

Poisons.—See **Antidotes** under each heading in the text, and **Emetics**, also special Chapter at end.

Polio-encephalitis, Acute.—A form of it epidemic in certain large towns in England and France, but all cases now met with are not due to the *B. botulinus.*—F. G. Crookshank, L. i./18,653. See also W. Broadbent *ibid.*

Botulism.—A form of food poisoning described by Van Ermengem in 1895. Symptoms correspond closely with those in so-called sausage poisoning met with in Germany and other countries where sausages and ham are eaten in an imperfectly cooked condition. Résumé of knowledge on, see B.M.J. i./18,511. Microscopically the *B. botulinus* is a straight rod shaped slightly motile organism producing spores and not unlike *B. anthracis* in appearance.—J. Stanley White, P.J. i./18,222.

Botulism—cases of so-called—indistinguishable from types of *Polio-Encephalitis* or more accurately Meningo-myelo-encephalitis. Exemplified in epidemics of the Heine-medin disease.—F. G. Crookshank, L. i./18,699, see also C. H. Melland, B.M.J. i./18,559, also Wilfred Harris, L. i./18,568.

Poliomyelitis referred to insect bites.—L. ii./13,1378 and 1380.

Hexamine has been successful.

Polypi. (*Local use.*)—*Hydrogen Peroxide* (and Borated)—styptics.

Polyuria.—To reduce output—pituitary. *See also* INCONTINENCE.

Portwine Stains.—Radium rays.

Post-Partum Hæmorrhage.—*See* **Hæmorrhage.**

Pregnancy, Vomiting of.—Aconite, *Adrenalin*, Argent. Nit., Arsenic, Belladonna, Bismuth preps., Cerii Oxalas, Chloral, Chloroform, Cocaine, Corpora Lutea, Creosote, Hydrocyanic Acid, Iodides, Iodi Tinct. m.i. in ounce Aq. every two hours. Ipecac. Vin., Iridin, Menthol, Morphine preps. and inj. hypod., Nux Vomica, Pepsin, Phanazone, Pot. Permang., Quinine preps., Sedeff, Spt. Nucis Juglandis.

To increase elimination of toxic degradation products.—Calomel with Sodium Bicarbonate.

Methods of prophylactic treatment when sickness has developed. Wash out stomach,—bowels, kidneys and skin to be kept active (Mercury and Chalk, Soap Enemata, Haustus Imperialis).—B.M.J. ii./11,69.

Pregnancy.—*See* **Uterus,** to **contract.**

Prickly Heat.—Hyd. Perchlor. Lotion (*q.v.*) made with Dilute Hydrochloric Acid.

Prolapsus Uteri.—Quinine injected,

Prostration.—Amyl Nitrite Capsules, Catha and Coca preps., Oxygen Inhalation, Stimulants. For rectal Injections see p. 351 *et seq.*

Prurigo.—Arsenic, Bromides, Cantharides, Iron Salts, Pilocarpine, Quinine preps., Quinine Lygosinate, Sodii Carb , Thorium Salts, Trilactine.

Acid. Boric. Lotio and Ung., Acid Carbolic. Lotio and Ung., Acid. Oxy-Naphthoic., Borax, Cocaina, Ichthyol, Iodine Colloidal, *Iodoformi Ung., Liq. Ammon. Dilut., Liq. Hydrarg. Perchlor., Liq. Plumbi Subacet. Dilut., Lysoform, Oleogen Comps., Pilocarpine, Staphisagria, Sulphur Ung., Tar, Ung. Rusci. Co., Ung. Sulph. cum Hydrarg.,* Anderson's Ointment.

Pruritus Ani, Vulvæ, &c.—*Acid Carbolic. Lotio and Ung.*, Acid. Picric Lotio, *Acid. Salicylic. Ung., Acid Sulphuros. Lotio, Alkalis (Lotion of)*, Aloes Tampons, *Alum Lotion, Anderson's Ointment, Argent. Nit. in Sp. Aether Nit.*, Bismuth Oleas, *Bismuth Subiodate, Bismuth Subnit.*, Calcium Lact. (gouty), *Calomel dusted on, Carbolic and Cocaine Lotion, Carbonis Deterg. Liq. Lotio.* 2%, *Chloretone, Chloroformi Ung., Cocain. Ung., Conii Ung.*, Formosyl, *Gallæ cum Opio Ung., Glycerinum Plumbi Subacet. Ung., Hydrarg. Oleat et, cum Morphina, Hydrarg. Subchlorid. Ung., Hydrastis Liquid Extract and Hamamelis injected*, Ichthyol Suppos., Liq. Picis Carb., *Lotio Nigra, Mentholeate, Menthol et Boracis Lotio., Naphthalin Ointment and Suppos., Orthoform, Potass Cyanid. Lotio.*, Sodii Salicyl., Sodium Thiosulphate, *Tannin*, Tinct. Cannabis, *Ung. Acid. Boric. Ung. Rusci Co.*, Uranii Oleas Zinc Valer, X' Rays, Radium Rays.

In a case of pruritus vulvæ Opium in 1 grain doses was the only drug giving relief.—B.M.J. i./12,472.

Psoriasis.—Arsenic preps., *e.g.* *Arsamin* and Cacodyl preps., Cantharides, Chaulmoogra Oil, Granula Dioscoridis, Hydrarg. Iodid. Viride, Iron Salts, Morrhuæ Ol., Phosphorus, Pil. Asiatica, Quinine preps., Sulphur.

Acid Acetic Glac., *Acid. Carbolic Ung.*, *Acid. Chrysophanic Ung.*, *Acid. Pyrogallic Ung.*, *Acid. Salicylic Ung.*, Adrenalin preps., Anserine Mulls Medcated, *Anthrarobin*, Argent. Oleas, *Aristol*, *Betulæ Pyrolig. Ol.*, Carbonic Snow, *Carbonis Deterg. Liq. Lotio*, *Chaulmoogra Oil*, *Fagi Pyrolig. Ol.*, *Formosyl*, Harrogate Water, *Huile de Cade and Ung.*, Iodates, *Lanolin*, *Naphthol Picis Ung.*, *Potass. Sulphurata*, Radium, *Rusci Pyrolig. Ol.*, Sodii Carb., *Sulphides* (*in baths*), *Sulphuris Hypochloritis Ung.*, Uranii Oleas, Thorii Oleat Ung., *Thymol Iodide*, Thyroid Gland (Standardised), *Trilactine*, *Ung. Acidi Pyrogall. Oxidat.*, Ung. Iodi Intinctum, *Ung. Rusci Co.*, Uranium Nitrate Lotion, Vaselinum Creosoti, Alkaline Baths.

Employ internal remedies acting on the blood and nervous system, *e.g.*, Ammonium Bromide sometimes with Cinchona and Arsenic stop the itching. In certain cases Zinc Valerianate is of benefit, also Cannabin Tannate in three to five grain doses three or four times in 24 hours. In a very severe case Opium 1 grain in pill was the only drug giving benefit. Calcium Chloride has been advised as the condition is said to be due to deficiency. If due to toxic absorption.—Salol and Mercury.

Locally Carbolic Lotion 2% gradually increased. Cocaine 5% increasing if necessary. Application of Liquor Potassæ has been highly spoken of. Solution of Perchloride sometimes allays itching. Lead Acetate Lotion, Ethy. Chloride. Occasionally Citric or Oxalic Acid Solution gives relief. Menthol in Paroleine 1 to 2% increased. Silver Nitrate Solution any strength up to 40 grs. per oz. Soothing Ointments, Bismuth, Cocaine Vaseline 5 to 20%.—B.M.J. i./12,472.

Many hold it is incurable. Arsenic the most reliable drug for treatment, especially in early cases and young patients. Sodium Cacodyl. hypod. has been used. Internally Iodides and Alkalies.—Pres. Nov. 1912,279.

Chrysarobin in use in the Army, *vide* idem.

Ionisation of 1% Sodium Salicylate or 0·5% Sol. of Sodium Sulphide.—(Lewis Jones). Arsenic Ions. *X Rays*.

Ammoniated Mercury 1 dr., Liquor Picis Carb. ½ ounce, Paraffin Ointment B.P. 6 ounces well rubbed in with a piece of flannel. If it fails, try Chrysarobin Ointment avoiding face, hands and scalp and stop treatment if Chrysarobin erythema appears on any part.—H. G. Adamson, L. i./17,223.

Ptomaine poisons.—Trilactine Milk preps. *See also* Antidotes to Poisons at end, and Ptomaines, *Vol. II.*

Ptyalism.—*See* **Salivation.**

Puerperal Fever.—Acid. Boric, Antifebrin, Antipyrine, Anti-Streptococcic Serum, Eusol intravenously, Ferri Perchlorid., Jaborandi, Nitro-glycerin *Nucleinic Acid*, Opium, Pilocarpine, Pot. Brom. combined with Belladonna, Quinine (2 grains every four hours.—V. J. Glover, L. i./17,352.), *Streptococcal Vaccine*, Terebinth. Ol., Veratrum.

Vaginal Injections of Sal Alembroth, or Mercuric Iodide Solution, or of Cyllin, Uterus irrigated with Injectio Iodi, C.H.W.—L. ii./09,338.

Normal Saline subcutaneously and Saline enemata useful in supporting a failing circulation and to carry off bacterial poisons.—L. ii./09,338.

No reliable specific means of treatment known. Polyvalent Serum from Streptococci from many cases of puerperal septicæmia seldom successful. Neither has vaccine therapy been of avail except in a few subacute or chronic cases. Much greater confidence in early exploration and clearing out of the uterus and swabbing with strong iodine solution and giving large doses of liquor ferri perchlor., to increase the general resistance, rather than upon any attempt to combat the infection itself.—Amand Routh Jl. Obstet., Oct. 1911.

Give a quickly acting aperient, croton oil (or Oleum Elliott—W. H. M.) Saline injection, morphine, Thyroid (30 to 40 grains), Nitroglycerin subcutaneously, Veratrum Viride, Pilocarpine, Oxygen.—C. E. Punslow, L. i./15,309.

Acid Sulphuric dil. 20 minim doses in puerperal infection (also for boils carbuncles, etc.), as a prophylactic against infection in all labours whether with manipulations or surgical interference or not.—J. L. Moir, L. i./15,149 25 to 35 minims should now be the dose.—*ibid*, 569.

Purgatives.—*See* **Constipation. Purgatives, Hypodermic.**—Aloin, Apocodeine, Colocynthin (may be emetic), Physostigmine.

Purpura.—Acid. Citric., Acid. Gallic., Acid. Sulphuric. Dil., Calcii Chloridum Ergota, Iron Salts, Lime Juice, Phosphorus, Quinine preps., Oleum. Tereb.

Pyæmia.—Autogenous Vaccine

Pyelitis.—Benzoates, B. Coli Vaccine, Collinsonia Canadensis, Erigeron Oil.

Pyorrhœa Alveolaris.—Vaccines, *e.g.*, a recently introduced Vaccine containing Strepto. also Spirochetes and Streptothrices *q.v.*

Argyrol, Colloidal Silver hypod. *Antiseptic mouth washes, e.g.* Lotio Acidi Citrici et Phenolis, *Eusol.*

Emetine HCl. Solution ½% applied locally and injected. Suggested that a few drops of *Ext. Ipecac. Liq.* should be used on the tooth brush as a matter of routine. Ipecac. might also be added to tooth powders. *Vide* Emetine and Pigmentum Ipecac. et Arsen.

Zinc Ionisation.

Pyrexia.—*See* **Fever.**

Pyrosis.—Acid. Hydrocyanic., Acid. Hydrochlor. Dil., Acid. Nit. Dil., Acid. Sulphuros., Atropine methyl-bromide, Bismuth preps., Carbo Ligni, Cerii Oxalas, Magnesia, Sodii Bicarb., Sodii Sulphocarbolas.

Quinsy.—*See* **Pharyngitis, Throat Inflammation.**

Rabies.—Vaccine (New).

Rat-bite Fever.—Arsenobenzol.

Rectum and **Colon Ulceration.** *See* **Colitis.**

Remittent Fever.—Apiol, *Arsamin,* Eucalyptus Globulus Quinine, and other Cinchona Alkaloids, Salicin. Salicylates, Salol, *Tylcalsin, Tyllithin,* Warburg's Tincture, *Mistura oleo-Balsamica.*

Restoratives.—*See* **Debility.**

Rheumatism, Acute.—*Acid. Phosphoric,* Acid. Acetyl-Cresotinic, Acetanilide, Aconite, Actæa and Cimicifugin, Aspirin, Benzoates, Caffeine-Chloral *Cocaine Ionisation,* Colchicum and Colchicin, Fæxin Ext., Ferri Perchlorid. Guaiacum, Lemon or Lime Juice, Lithion, Opium, Ozonic Ether, Phenacetin, Phenazonum, Phenocoll Hydrochlor., Potass. Acetas, Bicarb. Cit. or Nit., Quinine preps., Salicylates, Salol, Sodii Bicarbonas, Sodii Sesquiphosphas, *Tylcalsin, Tyllithin, Tylmarin,* Veratrum.

Methysal Balm, see also *infra. Strepto Vaccine.* Thymaglycin Mouth Wash prophylactic.

Salicylic Acid is the most powerful antirheumatic known, but is too irritating given as such. The action of all Salicylic compounds depends on the extent of their conversion into that body, and their dose on their content, *e.g.*, Salicin with 43% of Salicylic Acid has to be given in dose double that of Sodium Salicylate. 20 or 30 grains should be given every hour or two hours until one ounce has been taken and then in smaller doses if required.—Ralph Stockman, Pr. Jan. '12, p. 65.

This authority communicated a useful experimental research paper—(B.M.J. i./13,597)—on the use of Salicylic Compounds in acute rheumatic affections. Briefly Sodium Salicylate is found to be the most effectual body both *in vivo* and *in vitro.* We have made several abstracts under the headings—Sodium Salicylate, Aceto-Salicylic Acid, Saligenin, Cresotinic Acid, Salol, etc., *q.v.*

B. Coli Vaccine intravenously in recent arthritis.

Rheumatism, Chronic.—Acid Citric, Acid Hydriodic and Iodic, Actæa, Amyl Salicylas, Antim. Sulphurat., Arsenic, Aspirin, Bisciniod, Caffein Salicyl., Chloral with Camphor and Menthol, Cimicifuga, Cinchonidinæ Salicylas, Colchicum, Conf. Guaiaci Comp., Ethyl Iodid., and Salicyl., Coloidal Metals, Ferri Iodid. Syr., Ferri Salicylas, Formates, Gaultheriæ Oleum, Gelsemium, Granular Eff. Piperazine and Phenocoll, Hydrangea, Ibogain, Ichthyol, Ichthyol Salicyl, Iodeol (injection), Iodoprotein Tabs., Lithii Hippuras, Lithion, Magisal, Manaca, Methylene Blue, Ol. Morrhuæ, Ol. Succinni, *Paraffin, Molle Injections,* Pelletierina, *Phenoquin,* Phytolaccin, Pilocarpina, Piperazi, Benzoate and Glycerophosphate, Podophyllin, Potass. Iodid. et cum Quinina, Quinin. Hydriodid., Radio-active Waters, *Radium, Emanation Inhalation,* Rhus, Safrol, *Sarsaparilla preps.,* Sodii Boro-Salicylas, Sodii Cresotinas Sodii, Formas, Solani Ext. Liq., Sulphur, Trilactine, *Tylcalsin, Tyllithin,* Xanthoxylum.

Alcoolat de Fioraventi, Amysal, *Atropinæ Linim., Bellad. Linim. and Linim Co., Belladonnæ Chloroformum and Tinct. Ætherea, Betol, Camph. Co. Linim. Capsici. Emp. and Linim., Chloral cum Camphor., Caffein and Sodium Salicylate* *njected, Croton Oil Liniment*, Ethyl Chloride Spray, *Eucalyptus Oil*, *Gaultheriæ Oleum*, *Glycopasta Aconiti et Belladonnæ*, *Iodine*, Cocaine Solution and Chloroform Ionised, Lin. Menthol Comp., *Lithium Iodide Ionised*, Mag. Sulph injected, Methysal Balm, Methyl Salicylate *and Plaster* and Ung., Oleogen preps., *Ol. Succini*, *Opii Linim.*, Potassii Lactas, Sal. Marin. Artif. *Sassafras Oil*, Unguentum Iodi Intinctum, Ung. Acidi Salicylici.

Pyorrhœa, tonsillitis, and other forms of local sepsis often the initial lesion in rheumatism and gout. Removal of offending teeth often successful treatment.—L. ii /09,1665.

Calf Vaccine Inoculation has been found to improve.

Of internal remedies the Iodides, quite apart from the possibility of a syphilitic taint, are useful,—must be administered in large doses. The action of Arsenic is slow, must be given for weeks or even months. *Oil of Celery thought to act as an intestinal antiseptic.* A good combination is a *mixture containing* 15 *minims of Tincture of Actæa Racemosa with* 5 *minims of Tincture of Gelsemium* three times a day.—Sydney Ringer.

Guttæ Iodi (*Favier*). Iodine 4 grains Alcohol 90% 1 drachm, Glycerin to 1 ounce.

Rheumatoid Arthritis.—Actæa and Guaiacol, Adrenalin, Arsenic, Aspirin, Colchicum, Droitwich Baths, Emulsio Paraffini et Bismuth Fel Bovini, Ferri Iodid., *Ferri Iod. Sacch.*, *Formates*, Guaiacol Carbonate, Hydrarg. Oleas10%, with Morphaine ½ grain to 1 drachm (locally), Iodoprotein Tabs., Lithii Carb. and Citras, *Lithii Iodid.*, Morrhuæ Ol., Potass. Bromid. and Iodid., Quinine Salicylate with Salol, *Tylcalsin*, *Tyllithin*, Thymus and Thyroid preparations (latter *Standardised*).

Inoculation with Calf Vaccine Lymph has relieved pain

Ac Formic Injections, *Radiant Heat*, Radium and Emanation, *Sulphides (baths of)*, '*X*' *Rays*, Ung. Sabinæ in conjunction with Cantharides, Salol Collodion, Iodine, and Salicylic Ions, Blister applied to the spine. *v.* p. 262.

For a recent contribution on the diagnosis of gout, rheumatism, gonococcal arthritis, infective and septic arthritis, tuberculous syphilitic disease of the joints, Still's disease, Raynaud's disease and methods of treatment (diet should be liberal as distinct from that in gout).—See A P. Luff, Pr. Jan. 1912, —for a brief abstract see p. 377.

A useful account of lines of treatment.—Sir J. Barr, B.M.J. i /13. 753.

Rheumatoid Arthritis is caused by absorption of toxins which first affect the nerve supply to the joints and surrounding muscles. Disorganisation of the joints themselves is a later phenomenon. Heredity, injury, exposure, worry, and malnutrition predispose. Treatment must be directed to the disinfection of the focus of infection. Long standing cases well treated by Autogenous Vaccines.—M. J. Rowlands, L. i.16/, 133.

Notes on Treatment of.—E. A. Dent, B.M.J. i./18, 365.

Rhinitis Atrophic.—Zinc Sulphanilas packing. Also Zinc Ions

For consideration of Acid-Fast and Alcohol-Fast, organisms in as found by Wyatt Wingrave, *see* B. Tuberculosis vol. II.

Rhinitis.—*See* **Catarrh, Nasal.**

Rickets.—Acid. Phosph. Dil., Calcii et Ferri Phosph. Pil., Calcii Hypophosph. Syrup., Calcis. Liq. Cacch., Calcii Chlorid., *Lactas* Phosph., Lacto-phosph., Syr. and cum Ferro. Cinchona preps., *Cupri Arsenis*, Emulsio. Ol. Morrhuæ cum Glycerophosph., Ferri Phosph. Syr. and Comp., Ferri Iodidum, Ferri Vinum, Foods A, B. and C, Glycerophosphates, *Glycerol Glycerophosphatum cum Medulla Rubra*, Lecithin Emulsion, Liq Ferri Hypophosph. Comp., *Liq. Iodo-Ferro-Mang. Pept.*, *Malt Ext. c. Hypophosph.*, *c. Hæmoglobin*, *c. Pancreatin*, *etc.*, *Maltolivine*, Marrubin (and Comps.), Morrhuæ Ol., Ol. Morrhuæ Phosphoratum, Pavimol, Phosphorus, Plasmon, *Milk and Glycerophosphate*, Pituitary Extract (?), *Russian Hemp Seed*, Sodii Phosphas, Thymus Gland, Thyroid preps. (Standardised), '*Three Gland*' *and* '*Four Gland*' *Elixir and Tablets*, Trilactine, Sacch. Wheat Phos., Zinc Phosphide.

Discussion on Rickets —By way of prophylaxis chief points to avoid are, too prolonged breast-feeding and, in bottle-fed children, too dilute a mixture being used.—L. i./12,233.

A "deficiency" disease, *cf.*, Fat Soluble A Accessory Food factors.

Experimental Investigation on Rickets. A valuable study. Condemnation of Vegetable Oils as food substitutes. Cod Liver Oil, Butter and Suet have well marked preventive action.—E. Mallenby, L. i./19,407.

Vitamines are unstable molecules. Vegetables should be steamed rather than boiled.—Lister Inst. Work.—Biochem. Jl. Dec. 1918 abst. L. i./19, 622.

Rigg's Disease. (*Locally.*)—Acid Trichloracetic, *q.v.*

Ringworm.—*See* **Tinea.**

Rodent Ulcer. (Calcii Permang. internally) *Local use.*—Boric Lotion, Scarlet 'R' Carbonic Snow, Liquid Air, Radium Rays, Uranium Calcium Phosph. Irradiation, Uranium Ions, *"X" Rays, Zinc Ions.*

Saint Vitus's Dance.—*See* **Chorea.**

Saliva, to promote.—Ether, Ginger, Horseradish, Iodides, Jaborandi, Mercurials, Most Emetics, Mustard, Pelletierine, Pepper, Physostigma, *Pyrethrum Glyco-gelatin (Pastils of)*, Tab. Formalin, Tobacco.

Saliva, to check excessive.—Acid. Hydroch. Dil., Atropine and Belladonna, Chlorates, Coto, Picrotoxin.

Acid. Boric., Alumen, Borax, Chlorates, Creosoti Vapor, Lysoform.

Sarcinæ.—Acid. Sulphuros., Betanaphthol, *Bisciniod*, Calcii Chlorid. Salol, Sodii Hyposulphis, Sodii Metabisulphis, Sodii Salicylas, Sodii Sulphis.

Lavage.

Scabies.—*Calcis Sulphurat. Lotio, Cyllin, Hydrarg. Perchlorid. Ung., Liq. Carbonis Detergens*, Lotio Boeck, *Lysoform, Naphthalin Ung., Naphthol Ung.*, Perfumed Formosyls, *Peru Balsam, Pigmentum Thymol, Potass. Sulphurat Balnea, Styracis Ung., Sulphur Ung., Sapo Viridis*, Ung. Resorcin Co., *Ung. Rusci Co.*, Ung. Thorii Oleat.

Scabies treated by *Chlorine.* The gas is fatal to the acarus—one to two parts per 1,000 of air by volume. Gas helmets worn as protection. Exposure 5 minutes on successive days—usually four. Useful results in treatment in the army. Effectual in preventing spread of scabies.—G. H. Clark and H. S. Raper, B.M.J. ii./17, 113.

Sulphur ointment liberally used is best, after washing with soft soap all over the body on three successive days. Application in patches is no good.—H. G. Adamson, L. i./17, 223.

Scalds.—*See* **Burns.**

Scarlatina.—Acid. Salicylic., Aconite, Ammon. Carb., Antidiphtheritic Serum, Antistreptococcic Serum, Belladonna, *Calcium Sulphid.*, Eucalypti Tinctura, Formalin Spray, Ozonic Ether, Potassii or Sodii Chloras;

Ol. Eucalypt. rubbed lightly all over the body has been suggested, or inunction with Eucalyptus Vaseline, in conjunction with swabbing the throat with 10% Carbolic Oil.

(For sore throat in) Antiseptic Gargles and Mouth Washes, *Compress of Salicylic Acid 2% in Alcoholic Solution.*

Scarlet fever and German Measles, also scarlet fever and measles,—Differential diagnosis.—L. i./12,567.

Scarlet fever infection is not conveyed by air.—F. H. Thomson, L. i./16,341.

Scar Tissue.—To relax and remove From gullet, stomach, also uterine adhesions.—*Thiosinamin, e.g.*, in form of Cicatricine and Inj. Thiosinamin Sod. Salicyl. for injection.

Sciatica.—Acetanilide, Actæa and Cimicifugin, Alum Aceto-Tatras, Aspirin, *Bisciniod*, Codein. Sulphas, Colchicum and Colchicin, Conf. Guiaiaci Comp., Droitwich Baths, Ether Injection, Glycerophosphates, Lithii Citras Methylene Blue, Morphinæ inj. hypod., Phenazone (and Injected c. Cocaine), Pil. Ext. Cannabis, Opium Ext. with Valerian or Suppos. with Cocain, Piperazine, *Piperazine Glycerophosphate*, Potass Iodid., Quinine Salicyl., Salol, Sodii Salicylas, Strychnine, Perebinthinæ Ol., 'Theo-Sod.-Acet.,' 'Theo-Sodo-form, 'Theo-Sodo-Sal.,' *Theo-phylline-Sodium Acetate*, Trilactine, *Tylmarin, Tylcalsin, Tyllithin*, Uricedin.

Tropacocaine Injection and stretching the nerves.

Aconitinæ Ung., Amysal, Bellad. Linim., Chloroform. Linim., Cocaine Ionisation, *Ether Spray, Ether injection*, Iohydrin, *Menthol, Menthol cum Camphora, Menthol Linim., Methyl Chloridum*, Methysal Balm, *Ol. Betulæ*, Oleogen Camphor and others, Radiant Heat, Radium, *Veretrinæ Ung.*, 'X' Rays.—Salicylic Ionisation.

Scrofula.—Arsamin and other Org. Arsenic Compounds, *Bismuth and Zinc Iodates*, Calcii Chorid., Calcii Hypophosphis, Calcii Phosph., Calcii Sulphid, *Ext. Malti cum Iodinol*, Liq. Alk. Brandish, Ferri et Calcii Phosph. Pil., Ferri Iodid. Syr., Ferri Phosph., Hydrarg. Iodid. Virid., Iodoform, Iodoprotein Tabs., Iodum, Maltolivin, Marrubin and Comps. Morrhuæ Ol. and Emuls., Pavimol, Potassa Sulphurata, Quinine preps., Sodii Phosphas, *Sirop Neurotonique, Syrup. Iodo-Tannic, Syrupus and Vinum Tann-Iodophosph.*, Trilactine.

Scurvy.—Arsenic and Iron, Calc. Lact., Lime or Lemon Juice, Phosphorus, Potass. Chloras and Citras, Sassafras, Sodii Carbonas, Sodii Citras, Sodii Lact.

Scurvy, Infantile.—The anti-scorbutic factor of Lemon Juice after removal of Citric and other Acids, and substances likely to be irritant has been used clinically with success—the equivalent of 6 to 12 lemons daily can be given.—A. Harden, S. S. Zilva, and G. F. Still, L. i./19, 17.

C.f., 'Water-Soluble C' Accessory Food Factors.

Sea-Sickness.—Acid. Hydrobromic., Antipyrine, Amyl Nitris, *Atropine Drops in one eye,* Bisedia, *Bon Voyage*, Brometone, Chloralamide, Chloretone, Chloral Hydras, Chlorobrom, Chloroform and Tinct. Co., Chlorof. Perles or Caps. Cocainæ Hydrochlorid., Cocaine tablets and solutions, Eucalypti Troch., Hyoscine, Hyoscyamina, Iodi Tinct., Morphinæ inj. hypod., Nitroglycerin Tablets ($\frac{1}{200}$ gr.), Phenazone, Potass. Bromid., Sedeff, Sodii Bromid., Sodii Nitris, Malourea and Sodium Malo-urea.

Counter-irritants to stomach, Ice-bags to the spine.

Some recommendations. Hyoscine Hydrobromide $\frac{1}{200}$ grain by mouth or otherwise is said to be a capital preventive.—B.M.J. ii./10,1103. See also Strychnine with Atropine hypodermically or *per os*, our page 726.

Mal de Mer.—*Sedative* treatment: Liquor Iodi Fortis, Dilute Hydrocyanic Acid, *a.a.* 12 minims, Water to 6 ounces. One ounce every 10 minutes. Four doses taken were effectual.

Then *Aperient*: Black Draught. *Subsequently* tonic, Potassium Bromide, Strychnine, Gentian, etc. Successful.—A. H. Hare, L. ii./15, 779.

Seborrhœa.—Locally—*Formosye Ointment*, Resorcin Lotion and Ointment Sulphur and Salicylic Acid Ointments, *Thorii Oleat. Ung.*, Sulphur Stearette internally, Uranium Oleate (as Ung.).

Dandruff to Remove.—Wash the head with soap and spirit and then dry. Rub in well an ointment of Precip. Sulph. gr. xv., Salicylic Acid gr. xv., Soft Paraffin 1 ounce, or if greasy applications disliked a lotion of Salicylic Acid 2 drachms, Castor Oil 3 drachms, Eau-de-Cologne 1 ounce, S.V.R. to 6 ounces. In chronic cases Sulphur Præcip. ½ ounce, Glycerin 2 ounces, water to 4 ounces. D. C., Sept. 22, 17.

Septicæmia and Pyæmia.—Acid. Salicylic, Acriflavine, Antistreptococcic Serum and *Vaccine*, *Antistaphylococcic Vaccine*, Eucalyptus Globulus, Eusol intravenously, Ferri Perchlor., Fæxin, Hydrarg. Benzoas, Nucelin, Quinine preps., Resorcin, Salicin, Sulphites, Saline Injection.

Dakin's Solution must *not* be given intravenously.

Shingles.—See **Herpes Zoster.**

Shock, Surgical.—Adrenalin, Brandy hypodermically, Ergot, Ether, Gum Acacia in Saline, Morphine, Oxygen, Oxygen with Alcohol, Pituitary Extract, Saline transfusion, Supra-renal Extract. Strychnine.

Sickness.—*See* **Vomiting**, also **Sea-Sickness.**

Sinuses Tuberculous.—Iodoform preps., Creosoted Oil.

Skin Diseases.—*See* **Eczema, Psoriasis, &c.**

Skin Disinfection.—*See* Skin Sterilisation.

Skin Irritation. (*Local use*)—Acid. Hydrocyan. Dil., Bran Bath, Cod Liver Oil with Huile de Cade as pigment, Corrosive Sublimate lotion Sodii Carb., Zinc Cream, See also **Eczema.**

Skin Proliferants.—Allantoin, Acriflavine, Symphytum, Scarlet R.

Skin Sterilisation.—2% Iodine in 70% Alcohol (p. 503) Mercuric Chloride 1 in 500 in Spirit, to 1 in 2000 Biniodide and Spirit. Eau de Cologne has been used.

Alcohol alone is efficient: Perfumed Formosyls.

Sleepiness.—Pituitary or Thyroid Extract suggested. Tea, coffee, Digitalis and Vinegar were classed by Pareria (1854) as antihypnotica.—Pr. Dec. 12,765.

Sleeping Sickness.—*See* **Trypanosomiasis.**

Sleeplessness.—*See* **Insomnia.**

Small Pox.—*See* **Variola.**

Smell, Loss of Sense of.—Borated Hydrogen Peroxide has led to regained sense of smell.

Smoking Habit, Excessive.—*Wash the mouth out with Silver Nitrate, 1 in* 250. Anti-smoking gum. Formosyl Pastils, Menthol and Eucalyptus Pastils.

Snake-bite.—Alcohol and Ammonia, *Blepharis Capensis*, Potass. Permang., Strychnine injec. hypod., Calcii Chlorid. injection and internally, Tinct. Ammon. Comp., *Mistura Olea-Balsamica.*

Arnicæ Tinct., Blepharis Capensis, *Chloroform. Chloral cum Camphora*, *Cocainæ Hydroch. Liquor*, Hydrogen Peroxide.

Spray the part with Ethyl Chloride, whilst making incisions and rubbing in Potass. Permang. See also p. 537. Gelatin Solution per os for hæmorrhage.

Cocaine Hydrochlor injected in full doses at the site of puncture caused by fangs of the snake not only relieves the pain, but causes reduction of the swelling if promptly used. Well combined with *permanganate*. Oozing hæmorrhage which occurs from all mucous surfaces is reduced by taking large quantities of *gelatin* solution 5%, per os.—J. C. Fox, B.M.J. i./15, 632.

Sneezing, Chronic.—Several methods of treatment.—B.M.J. i./07,724.

Sneezing, Spasmodic.—Calcii Chlorid. *q.v.*

Spasm.—Aconite, Æther, Ammon. Arom. Spt., Amyl Nitris, Atropinæ inj. hypod., *Benzyl Benzoate*, Cajuput Ol., Camphora, and Camphor. Spt. Fort., Chloroform, and inhaled Chloromorphiæ Liq., Conina, Erythrol Nitrate Tablets, Ext. Grindeliæ Liq. (of larynx). Mannitol Nitrate Tablets, Menth. Pip. Ol., Mistura Ætheris cum Ammonia, Opium, Papaverine (Gastric and Intestinal), Piscidia.

Speech Fright.—*See* **Stage Fright**, also **Nervousness.**

Spermatorrhœa.—*See* **Incontinence of Semen.**

Spina Bifida.—*Iodine Liniment, Iodo-Glycerin injection.*

Sporotrichosis.—Potass. Iodid.

Sprains.—*Arnica, Fomentations (hot) of Poppy-head or Belladonna, or cold with vinegar, or spirit lotions, Lead and Opium Lotion, Lotio Ammonii Chloridi.* When chronic, *Liniments of Belladonna, Chloroform, Camph. Co. Lin. Tereb. Acet., Radiant Heat, 'X' Rays.*

Spring Catarrh.—See Catarrh. Nasal, and Hay Fever.

Sprue—Castor Oil, Cyllin, Koumiss, Milk Diet, Pepsin, Santonin and *Golden Santonin*, Ipecacuanha sine Emetina.—*Trilactine Milk and Tablets* after Milk Meal. *Locally.*—Lysoform.

Stage Fright.—Cannabis with Laudanum. Gelsemium (*q.v.*) Laudanum, Opium Pills, Opium with strong coffee (Morell Mackenzie), also with Sal Volatile and Camphor Water. Three deep inspirations valuable.—B.M.J. i./09. 1379, 1456, 1499, 1510, 1573 ; ii./09, 40, 50, 178, 404, 420.

Sterility.—Certain Mineral Waters are advocated, *e.g.*, Eaux Bonnes

Stings.—*See* **Bites.**

Stomach Dilatation.—Sodium Phosphate as nervine tonic—as antiseptics, where fermentation to overcome.—Bismuth Salicylate, Salol, Betol, Naphthol, Benzonaphthol, Eff. Sod. Mag. Aper., Trilactine Milk.

Stomatitis.—Eucalypti Globuli Tinct., Hydrastis, Laudanum, Potassii Chloras, Sodii Bisulphis, Sodii Chloras.

Acid. Boric., Acid. Carbolic, Acid. Picric as paste (stomatitis mercurialis), *Acid. Salicylic, Acid. Sulphuros, Alumen, Borac. Glyc. and Mel., Calcis Aqua, Collutorium Hydrog. Perox., Cupri Sulph.* Formosyl Mouth Wash, Hydr. Perchlor. Lotion 1 in 5,000, Iodine Colloidal, Liq. Alum. Aceto Tart. as mouthwash frequently, *Myrrhæ et Boracis Tinct.*, Perfumed Formosyls (diluted), Salol Mouth Wash, or stronger as paste to brush the parts ; *Sodii Chloras*, Potass. Chloras.—*See* **Pastils.**

See abstract of article by Sir K. Goadby, p. 772.

Stenosis of Pylorus, Urethra, &c.—Cicatricine, Opii. Tinct. *q.v.*

Strictures.—Cicatricine, Radium (œsophageal), Ung. Thiosinamin.

Styes.—Copper Point or Copper Sulphate Solution.

Styptics.—*See* **Hæmorrhage.**

Sunburn.—*See* **Freckles.**

Sunstroke.—Ammon. Carb., Apomorphina, Atropinæ inj. hypod., Digitalis, Ergot, Hyoscina, Morphinæ inj. hypod., Quinine, Veratrum.

Purgative enemata. Sinapis Emplastrum.

Sweats.—*See* **Night Sweats.**

Sweating feet.—Alum Acet., Formalin, Formosyl, Pulv. Salicyl. cum Talco

Sycosis. (*Local use*).—Arsenobenzol, Bismuth Oleas, Formosyl, *Ichthyol*, *Liq. Hydrarg. Perchlor.*, Hydrog. Perox. (1 to 2 vol.), Perfumed Formosyls (diluted), Cranii Oleas, *Sulphur*, Ung. Cupri Oleat 10%, *Ung. Hyd. Ammon.*, *Ung. Hydrarg. Nit.*, Ung. Hydrarg. Sulph. Flav., Ung. Thorii Oleat, 'X' Rays.

Sycosis and other chronic staphylococcic skin infections. Prevention and treatment.—H. G. Adamson B.M.J. i./18,8.

Synovitis.—Ext. Solani, Liq. has been advised. Static Electricity.

Syphilis, Constitutional.—Ammon. Iodid., Antim. Sodii Tart., *Arsamin* and other Organic Arsenic Comps., Arsenobenzol alone and with Mercury and

Injection of Patient's serum after, *Auri et Pot. Cy. intrav.*, Auri Chloridum Barii Chloridum, Calc. Iodo. Ricinoleat, Condurango, Ferri Iodid. Syrup, Ferri Sulphanilas (Ferrivine), *Hectargyre*, *Hectine*, Hydrarg. cum Creta, Hydrarg. Cyanid. Pil., Hydrarg. et Potass. Iodid., Injectio Hydrarg. Intramuscularis, and other Mercurials, Iodinol, *Iodo.*, Iodum, *Iodine Colloidal*, *Mercurialised Serum*, Mist. Quin. c. Ferro, *Mist. Hyd. Perchlor. Co.*, Protein, Potass. Iodid. Pil. Quin. Hydrarg. et Opii, Quinine Hydrochlor., Quin. Hydrochloro-Carbamid and Hydr. Perchlor., Quinine Nucleinas, Quinine Periodide, *Salicin*, Sarsaparilla preps., Sodii Iodid., Stillingia, Strontii Iodidum, Succus alterans Syrupus Acidi Hydriodici, Tiodine. (See opening pages of Hydrarg. Chapter for *Hypodermic treatments*).

Arsamin Paste, *Hydrargyri Lanolinum*, *Hydrarg. Oleat. and cum Morphina Hydrarg. Ung.*, Iontophoresis of Potassium Iodide, and of Lithium Iodide Solutions. Ung. Prophylaxis (capsules of).

It is stated *Mercury Biniodide in* 2% solution with 2% Sodium Iodide, *dose* 1 *cc.* (= 0·02 *Gm. Mercuric Iodide*), *is the least painful and in general the best soluble salt for injection. Of insoluble preparations*: Calomel is the most effective, but always very painful. *Treatment.*—Presence of syphilis must be absolutely ascertained before mercury is begun. *Method of giving.*—More or less continuous course by the mouth for 1½ to 2 years. Inunction and injection more likely to prove efficient for the Army. *Precautions.*—Weight, urine (? albumen), mouth, and gums to be watched. *For Inunctions.*—Ung. Hydrarg. 40 grains, Adeps Lanæ 20 grains, on each occasion, daily, for 20 to 30 minutes, the course being 42 more or less. Plan of 2 years' treatment is given:—1st and 2nd Course 42, then 3 months' interval after each. 3rd and 4th Course 30, then 6 months' interval. 5th Course, 20. *Soluble* injection.—Hyd. Perchlor. 8 grains, Sodium Chloride 4 grains, Water 400 minims. 10 minim doses. *Insoluble Injection.*—The ***Injectio Hydrargyri Intramusc.*** 10% (*vide* our p. 448), is the *standard* preparation.—'Treatment of Venereal Disease in the Army.' *c.f.* also p. 202 for ***War Office Method.***

Good results on injection of Distilled Water in syphilis—every third day 6 to 8 Cc. into the subcutaneous tissue of the back. One case, a man with 10 ulcers of the leg, which had refused to yield to any other treatment, had eight of them covered over by end of a fortnight.—L. i./13,799.

Errors in diagnosing extragenital syphilis.—M. Pinard, M.P. i./19,7.

For Methods of Diagnosis.—See Vol. II.

Syphilis, Skin Diseases.—Anserine Mulls Medicated, Argent Oleas, Bismuth Oleas, Colloidal Mercury and Silver, *Hydrarg. Ammon. Ung.*, Ung. Arsen Anserinat., *Hydrarg. Emplast.*, *Hydrarg. Nit. Ung.*, *Hydrarg. Oleat*, *Hydrarg Perchlorid.*, *Ung.*, *Hydrarg. Subchlorid.*, *Fumigation and Ung.*, *Hydrarg.*, *Ung.*, *Iodoformi Gossypium and Ung.*, Iodates, *Iodinol*, Mercurialised Serum, *Resorcin*, Thiol, Petroxolin preps., Perfumed Formosyls, Scarlet Ung. Urani Oleas.

Syphilitic Sore Throat.—*Alum Garg.*, *Borax Garg. and Mel Boracis*, *Chlorine or Sodii Chloras Garg. and Troch.*, Collutorium Hydrogenii Peroxidi, *Hydrarg. Cyanid. Garg.*, *Hydrarg. Perchloride Garg. and Pastil.*, *Insufflatio Iodoformi Comp. and Pastil Potass. Chlorat, Garg. Pastil. and Troch.*

Syphilitic Ulcers (*Local use.*)—*Acid. Chromic* (and Chromic Ions ?) Arsamin, Galyl and other Org. Ars. Comps., *Collod. Salicylic. c. Hydrarg. Perchlor.*, *Dusting Powder of Calomel and Bismuth*, *Hydrarg. Acid. Nit. Liq. Hydrarg. Flava and Nig. Lotio*, Hydrarg. Iodas., *Hydrarg. Naphthol*, *Hydrarg. Oleat. and cum Morphina*, *Hydrarg. Subchlorid.*, *Iodoform, and Collodium cum. Iodoformo*, *Iodoform Wool*, *Iodoformi Ung.*, *Resorcin*, *Zinci Chlorid. Iodid. and Nitras*, Ung. Antimonii, Ung. Arsenii Anserin, Ung. Iodi Intinctum. Internal Remedies, see Syphilis, Constitutional.

Tabes Dorsalis.—*See* **Locomotor Ataxy.**

Tachycardia.—Amyl Nitrite, Atropine, Cactus, Convallaria, Digitalin Nitroglycerin, Sparteine, Strychnine.

Tænia.—*See* **Worms.**

Tartar on Teeth, to dissolve.—Lotio Acidi Citrici et Phenolis.

Tattoo Marks, To remove.—Acid. Salicylic, Tannin and Silver Nitrate.—Ac. Nitric. (Ph. Form.), Glycerin Papain (?) Iontophoresis.

The methods of Variot and Briault excite an inflammatory process by means of chemical irritants so as to cause destruction of the skin surface. Variot places on the marks a concentrated solution of Tannin and tattoos this in. Then a Silver Nitrate pencil is rubbed vigorously over the surfaces until it becomes black. Then wash with water. In the next few days a slight inflammatory reaction occurs and a dark adherent crust forms which comes off in about 14 days with subsequent healing. Briault tattoos with a solution of Zinc Chloride 3 to water 4. The surface is also moistened with this solution after tattooing. Slight inflammation occurs. Skill and care required in this matter to avoid suppuration and deep cicatrisation Jl. Am. A., per P.J. ii./12,557.

Some use (*e.g.* Peller), a Thiosinanin compound injected first, then sharp edged needles are introduced carrying threads soaked in 50% Arg. Nit. Solution. These are kept in position for 2 or 3 days under hot fomentation.—C.D. ii./12,272

Tetanus.—Anæsthetics (to relax spasms), *Antitoxin, q.v.* for much important added matter in prophylaxis and treatment, Amyl Nitris, Bromides, Cannabis, Chlora Hydras, Chloretone Enema, Conina, Curara, Gelsemium, Hydrarg. Perchlor., Hydrogen Peroxide, *Intracerebral injections*, Iodine Colloidal (Oily), Liquor Arsenicalis, Sodium Chloride Injections, Morphine, Opium, *Paraldehyde intravenously, Parathyroid preps.*, Pelletierine, Physostigmine, *Pilocarpine, Sodium Persulphate* (*infra*), *Strophanthus.*

Oxidising Antiseptics.—H_2O_2, Permanganate, Chlorine water and Iodine are unfavourable to growth of Tetanus Bacilli, but Phenol, Magnes Sulph. have no apparent effect. See Tetanus and Mag. Sulph.

Spasms of Tetanus relieved by *Chloral Hydrate* up to 10 gm. per diem, by subcutaneous injection of Magnesium Sulphate (20 cc. of 2% solution 5 or 6 times per diem), and by injection of 20% Luminal-Sodium solution. Large doses of *Morphine* up to 0·3 gm. per diem useful.—German Army Experiences, B.M.J. ii./15, 906.

Thirst, to Relieve.—Acid. Citric., Acid Drops, Acid. Phosph., Dil., Acid, Sulph. Aromat., Acid. Tartaric., *Ammonium Iodide.* Coca, Cyperi Rad., Dec. Hordei Tartariz, Elixir Acid., Formalin Tablets (Internal), Haustus Imperialis Mucin, Pot. Chlor. Tablets, Pot. Cit., Potass., Tart. Acidus, Spondias Mongifera.

Throat, Inflammation of, and Tonsillitis—Acid. Salicylic, Aconit, Tinct. and Pastil, Ammon. Brom., Antimony, Belladonna, Cyperi Caps. or Mist., *Ferri Salicylas*. Formalin Tablets (Internal). Guaiacol, Jephson's powder, *Lichenoids*, Liq. Ferri Perchlor., Phenazone, Quinine HCl. Acid. as spray or paint, Quininæ Salicylas, Salicylates, Sodii Benzoas, Sodii Bicarb., Solubes (various), see Index, Strepto. or other Vaccine, Tab. Formalin (to suck). *Tylcalsin, Tyllithin.*

Adrenalin Spray, *Benzoin, Tinct. Vapor, Chlorates in Troch., Cocaine* (*Pigment of*), Collosol Argent. and Hydrarg., *Formalin Pigment, Guaiaci Trochisci, Iodi Vapor, Monsel's Solution*, Pyocyanase, Sodii Perboras, *Thymaglycine, Juniperi Ol. Vapor.*

Oyxgen and Alcohol Inhaler.

Throat, Relaxed Sore.—(*Local use.*)

Acid. Carbolic. Pastil., Acid. Tannic Garg. and Glycerin. Alumen aad Glyc. Aluminis, Alum Aceto-Tart. Liq. and Alum Format. Liquor, *Ammonii Chlorid Vapor, Ananassæ Tinct. (for septic), Argent. Nit., Benzoin. Tinct. Vapor, Bismuth. Pastil., Catechu Insuffi., Elixir Guaiaci, Eucalyptus Gum Insuffl., Ferri Perchlorid. Pigment, Ferro-Alumen, Guaiaci Troch., Hydrastis Tinct. and Rhus. Tinct. or as gargle, Iodine Colloidal*, Lichenoids, *Phenoloid Tablets, Pini Sylvest. Vapor, Uranii Nitras, Solubes* (*various*), see Index.

Ulceration of tonsils in Territorial soldiers.—Films stained by 5 per cent. Collargol solution, or by Gram's method omitting the alcohol bath, show Spirochæta fœtida (of Vincent's Angina,) with B. hastilis—the invariable associate of Vincent's spirochæte.

The spirochæta in question has many synonyms—sp. refringers, sp. dentium, sp. buccæ, etc. The best treatment for spirochætal ulceration is to remove the slough and swab the ulcer with 5% solution of Trikresol in Alcohol, or a 25% solution of Lysoform three or four times daily, with a frequent mouth wash of weaker strengths.—W. Wyatt Wingrave, L. ii./15, 176. *See also* Vincent's Angina.

FOLLICULAR TONSILLITIS—Eusol.

Thrush.—*See* **Aphthæ.**

Tic Douloureux.—*See* **Neuralgia.**

Tinea Favosa and Sycosis. (*Local use*).—*Acid. Carbolic. Glycerin, Acid Sulphuros, Croton Oil, Chrysarobinum*, Cupri Oleat. Ung., *Ethyl Chloride, Formaldehyde, Hydrarg. Oleat.*, Hydrarg. Iodas. *Hydrarg. Perchlorid. Lotio, Iodi Linim, Lanoline*, Nicotinæ Salicylas, Petroleum of Commerce, *Picrotoxin Pigment*, Pigment Acid Picric et Camph., *Pyrogallol*, Resorcin Sodii Chloridi

Ung., Cataphoresis of Copper Sulphate, *Sodii Hyposulphitis Lotio*, 'X' Rays. Copper Ionised.

Apply *Whitfield's Ointment ;* Benzoic Acid 1, Salicylic Acid 1, Cocoa Nut oil 12, Vaselin to 30 *or* first mop with Tincture of Iodine, then rub on Silver Nitrate 1 dissolved in Spirit Nitrous Ether 50. Repeat and apply the ointment betweenwhiles.—H. G. Adamson, L. i./17, 222.

Tinea Tarsi.—See **Ophthalmia Tarsi.**

Tinea Tonsurans and Circinata. (*Locally.*)—As for **T. Favosa** and—*Anacardii Oleum*, *Anthrarobin*, *Cantharid. Pigment*, *Chrysarobin*, Colloidal Ag. and Hg., Cupri Oleas, Ferri Perchlor. Liquor, *Formaldehyde Formosyl Hyd. Oleat Ung.*, *Hydrarg. Nit. Acid. Ung.*, *Iodi et Olei Picis Pigment*, *Iodized Phenol*, Iohydrin, *Izal*, Perfumed Formosyls, *Pyrogallol*, Sphagnol, *Salicylic Acid*, Sodii Carb. Cryst. melted hot, *Sulphur*, *Ung. Hyd. Iodid. Rub.*, *Ung. Potass. Sulphurat.*, *Ung. Sulph. Naphthol Salicylat*, Ung. Thorii Oleat., 'X' Rays.

Tinea Versicolor.—*Acid. Chrysophanic.*, *Acid Sulphuros.*, *Borac. Glycerin*, Chaulmoogræ Ol., Colloidal Ag. and Hg., *Formaldehyde*, *Lotio Calcii Sulphurati*, *Sodii Hyposulph. Lotio.*

Tinnitus Aurium.—Brominol. Oleogen Iodi, Pilocarpine Injection.

Digitalis in the pulsating form (not Alcohol), Bromide (useful at bedtime and often gives great relief), hypnotics, sedatives, *Cicatricine*, Paraldehyde, Potass. Iodide (where associated with vertigo), Pilocarpine (in cases showing Meniéres' symptoms.—L. ii./09,472.

Prolonged use of Phosphorus also Thiosinamin (hypod).

Toenail, Ingrowing.—Lead Nitrate as dusting powder

Toothache.—Acid. Hydrobromic, Atropine Methyl Bromide with Aspirin, Pil. Butyl-Chloral Hydras, Gelsem. with Chloretone, Delphinine, Gelsemii Tinctura, Morphinæ inj. Hypod., Neuralgic Pills, Piscidiæ Ext. Fluid., Quin. Tinct. Ammon.

Acid. Arsenios., *Acid. Carbolic. with Colloidon*, *Butyl-Chloral cum Menthol*, *Caryophyll. Ol.*, *Chloroform cum Camph.*, *Chloroform cum Mastic*, *Cocainæ* Cocaine-Menthol-Eugenol, Cocaine-Menthol-Phenol, *Creosotum*, *Eugenol*, *Iod. et Aconiti Tinct.*, *Liq. Sodii Carbolatis*, *Menth. Pip. Ol.*, *Opii Tinct. Pasta, Arsenicalis Potassii Permanganas*, *Pyrethri Tinct.*, *Resina Carbolica Sodii, Peroxidum.*

Tonics.—*See* **Anæmia, Debility, Fevers, Rickets, etc.**

Tonsillitis.—*See* **Throat and Pharyngitis.**

Toxæmia.—Alcohol (Brandy Sterules) hypodermically, Ether, *Eusol intravenously*, Purgatives, Diuretics, Jaborandi, Liver Dried, Sal Volatile, Stimulants, Strychnine.

Skin Affections in.—Antiseptics are: Arsenicals, Mercury and Quinine. —L. i./13,1384.

Toxæmia, Alimentary—Acid Hydrochlor. (Bouchard's Remedy), Emulsio Paraffini et Bismuthi.

Trachoma.—Preps Abrus.—Radium Rays—good results. Acid Carbonic Snow, Copper Sulphate (and Ionisation of), Silver Salts. See also Cancer.

Trench Foot.—Patients in the winter 1914–15 suffered mainly from a neuritis caused by exposure to wet and cold. A mixture containing Sodium Salicylate 10 grains, Sal Volatile 15 minims, Compound Tincture of Cinchona 20 minims, Syrup of Orange ½ drachm, water to 1 ounce, every four hours until pain relieved, then thrice daily. Rubbing is valuable for the pain.—W. Gordon, B.M.J. i./17, 121.

Oxygen injected subcutaneously. The oxygen passes through a wash bottle containing Saturated Sodium Carbonate Solution. The needle is inserted into the subcutaneous tissue at a point midway between the heel and external malleolus. The gas is allowed to enter slowly until the foot *is filled up*. The needle is then withdrawn and inserted midway between the internal malleolus and the heel. If the toes are black and cold the needle is inserted in the mid-line at the base of the toes. The gas should be injected slowly. The treatment is based on the conclusion that Trench Foot is akin to Raynaud's disease it helps to drive out the serum slowly but steadily, through the puncture holes. It balloons up the subcutaneous tissue and relieves pressure on the blood-vessels and lymphatics.—H. Oswald Smith, B.M.J. i./17, 511.

Nitroglycerin in small doses combined with a little Strychnine useful. It acts by dilating the peripheral vessels and increasing the deficient circulation. The treatment is accompanied by electricity.—E. S. Ellis, B.M.J. i./17, 513.

Iodine in combination with Liquid Paraffin useful—strength not stated.—R. T. Dobson, B.M.J. ii./17, 717.

Trichinosis.—Ergota, Ergotin, Liquor Arsenicalis, Sclerotic Acid.

Trypanosomiasis and Tick Fever. (*Local use.*)—Arsenic (Sodium Arsenate), *Arsamin* and combined with Hyd. Perchlor., Antim. Oxid. Inj Antimonii-Sodii Tartras, Mist.-Antim. et Pot. Iod., and other organic arsenic comps. *q.v.*, *Methylene Blue*, Injectio Antimonii Oxidi and Antimonii Cinnamica, Elixir Antimonii.

Tuberculosis, Laryngeal.—*Acid Lactic Spray or Pigment*, Ac. Picric, Inhalation, *Borax*, *Borax and Opium Gargle Boric Acid Insufflated*, *Cocaine (Lozenges and Spray)*, Eusol, Guttæ Cinnam. Co., *Iodoform*, *Iodine Inhalation*, *Menthol* 20% *in Olive Oil*, *Morphine Pastils of Cubebs*, *Potassium Chlorate or Ipecac.*, *Silver Nitrate Spray*, Vapor Creosot Co., *Vapor Olei*, *Pini Sylvestris*.

Tuberculosis.—*See* **Phthisis.**

Typhoid Fever.—Acetozone, Ammon. Carb., Carbo Animalis. Cinnamon Oil, Carbolic Acid, Cinchona Alkaloids, Emetine Hypod., Eucalyptus Globulus, Guaiacol, Hydrarg. Naphtholacetas, Subchlor, and Perchlor., Hydrogen Peroxide, *Iodates*, Iodine Tinct. and Phenol dil. to drink, *Magnesii Salicylas*, Mistura Chlori cum Quinina, Naphthalene, Naphthol (*a*), Olive Oil, Platinum Colloidal, Quinine Salol, Salicylates, *Santonin* (golden), Spleen Substance, *Sodii Acid. Sulph. as water disinfectant*, Sodii Chloras, Soda Chlorinata, Sodium Nucleinate Injection, Sulphurous Acid, *Thorium Sulphate*, Thymol, Vaccines and Sensitised Vaccines (T.A.B.), also Multiple Vaccines, Castellani, Tribromophenol, Trilactine Milk, Turpentine Oil (per rectum), *Tylcalsin*, *Tyllithin*, Zinc Sulphocarbolate.

Hæmorrhage, Intestinal from: Calcium Chloride, *Crocq's Pill*, Argenti Nitras, Ergot, Pil. Plumbi Acetatis cum Opo. Turpentine.

Locally Allantoin, Alcohol Compresses, Collosol Ag. and Hg., *Hydrarg., Perchlor. intravenously.* For rectal feeding see Enemata.

Sulphur in 1 Gm. doses five or six times during the day reduces temperature.—B.M.J. i./15, 48.

Heart Failure In.—Camphor, *e.g.*, Curschmann's Solution.

Venous Trombosis in—intravenously 0.5% Sodium Citrate up to $\frac{1}{2}$ pint.

Typhus. See Vol. II.

Ulcers.—*Acid. Boric. Lotio and Ung.*, *Acid. Carbolic. Lotio and Ung.*, Acid. Lactic, *Acid. Salicylic. Gossypium and Ung.*, Arden-ol., Alii Succus, *Argent. Nit.*, *Belladonnæ Glycerin*, *Bismuthi Oxyiodid.*, Borated Hydrogen Perox., Brilliant Green Ointment, Calcium Sulphide Stearettes, *Carbonis Cataplasm Collodium*, Colloidal Metals, Cupri. Acetas, *Cupri Oleat Ung.*, *Eucalypti Ung.*, *Eusol*, *Fermenti Cataplasm*, *Hamamelis*, Horse Serum (Antilytic Serum), *Hydrogen Peroxid.*, Iodates, *Iodoform*, *Iodol*, *Izal*, Linimentum Æruginis, *Lysoform*, Methysal Balm, Molybidic Acid Injection (?), *Naphthalin*, *Oxygen*, Unna's Paste, Pasta Amyli Iodid., Paste Carbonis et Zinci, *Plumbi Subacet. Glycerin. and Ung.*, *Potass. Permang.*, *Potassium Permanganate Pencils*, Quinine Lygosinate, Radium Rays, *Resinæ Ung. and Res. Ung. cum Chlorof.*, *Resorcin*, *Sal Alembroth Gauze*, *Salol*, *Sanitas*, Scarlet 'R.' Sheep's Serum, Sodii Citras locally to soften, Sphagnum Dressings, Strepto Vaccine, Symphytum Preps., Toluol (locally), Trilactine, *Ung. Pheno-Boric*, Ung. Potass. Chlorat. et Zinci, Ung. Thorii Oleat., *Zinci Chlorid.*, *Zinci Oleat. Ung.*, *Zinc Perhydrol*, *Zinci Sulph. Solube* as *Lotio*, Zinc and other Ions.

Calcii Chloridum (internally), 15 grs., *t.d.s.*—*See* B.M.J. ii./06, 138. Secondary Radiation from Argent. Precip.

Ulcer Duodenal.—Most cases are speedily relieved by a combination of Bismuth and Morphine. *Mist. Bismuthi Phenolis et Morphinæ, q v.* is useful.

To counteract constipation usually resulting from large doses of Bismuth give *Pil. Hyd. Subchlor. Rhei, Cascaræ et Capsicin.* When active symptoms subsided a tonic capsule of Papain 2 grains, Phenol 2 grains, Strychnine $\frac{1}{30}$ grain, Codeine $\frac{1}{4}$ grain, Rhubarb Ext. $\frac{3}{4}$ grain.—Guthrie Rankin, B.M.J. ii./10, 181. Significance of symptoms in duodenal ulcer.—Mansell Moullin, L i./12, 563.

Succus Allii diluted with three times quantity of water.

Ulcer, Gastric.—Aperfine, Argenti Nitras, Ferri Perchlor., Gelatin Glucose, Mistura Bismuth, Phenol et Morph., Normal Horse Serum, Normal Saline Injection, Ol. Olivæ, Secondary Radiation from Arg. Precip., Sheep's Serum.

Sodium Bicarb. 5 grains, Mag. Carb. 10 grains, and Bismuth Carb. or Subnit. 20 grains in Aq. 1 ounce, $\frac{1}{2}$ hour a.c. (milk diet) *t.d.*, is a good 'protective covering' in gastric ulcer.—Yeo.

In Gastric Ulcer.—(1) promote healing by plenty of nourishing food

2) "fix" the acid of the gastric juice and so prevent it from interfering with healing by ensuring that the food contains a large proportion of proteid; (3) prevent distension of the stomach by small feeds. Milk and egg diet is supplemented by Iron and Bismuth. Pain disappears early, vomiting quickly subsides and relapses are rare.—Hutchison.

Diagnosis.—*See* Stomach Contents Examination.

Uræmia.—Aconite, Amyl Nitris, Apocynum, Atropine, Bromides, Caffeine, Cannabinum, Digitalis, Elaterin, Pulv. Co., *Erythrol Nitrate*, Hydrarg. Subchlor. Jaborandi and Pilocarpine, Jalapæ Pulvis Co., Lithii Hippuras, Nitroglycerin, Papaverine, Saline Purgatives, *Saline Solution*, Scilla, Sodii Benzoas Veratrin, Strophanthus Preps.

Uræmia and Albuminuria well treated by 1 Cc. of 1% *Potassium Permanganate* solution injected hypodermically. A case of almost complete suppression of urine reacted remarkably to 10 drops of ½% solution. Some local pain at site of injection, but this is relieved by hot fomentation.—F. V. Davison, L. i./16, 430.

Uræmic Convulsions.—Bromides, Chloral (per os or per rectum), Chloroform, Jaborandi, Morphine, Saline Solution may prolong life. In the treatment of coma (i.) when blood pressure exceeds a certain point reduce by urgent means—venesection or catharsis, with compound jalap powder or elaterium: (ii.) with low blood pressure and rapid acting heart, digitalis.—B.M.J. ii./06,1449.—Urea Bromine.

Urethritis.—Argent. Nit. (0·02 to 0·1%) Irrigation or combined with Hydrogen Peroxide (1 to 2 volume), Glyc. Resorcin, Santalol and Tablets, Turpentine by means of catheter, Vanadic Acid Solution. *See also* GONORRHŒA.

Uric Acid Diathesis—*See* **Gout, Rheumatism.**

Urinary Calculi.—*See* **Calculi.**

Urine, To render Acid.—Benzoic Acid, Sod. Phosph. Acid (the natural acid of the urine), Salicylic Acid (increases acidity slightly). Large doses of Citric or Tartaric Acid.

Urine, to render Alkaline.—Potassium, Sodium, Lithium, Calcium Tartrates, Citrates and Carbonates of the above.—H.W.

Urine, Blood in.—Ammon Chlor., Calc. Lactas: Iron Salts.

Urine, Incontinence of.—*See* **Incontinence.**

Urine, Tests for Albumin, Sugar, etc.—See Vol. II.

Urinary Antiseptics, *See* **Antiseptics, Urinary.**

Urticaria.—Antipyrin, Apis Mellificæ Tinct., Bromides, Calcii Lactas, Cream of Tartar, Harrogate Water, Magnesia, Cream, Milk and Glycerophosphates, Mistura Alba, Sodii Bicarb., Sulphur (Stearettes), *Terebene*, Trilactine.

Acid. Benzoic. Lotio, Acid. Boric. Lotio, Acid. Carbolic Lotio, Acid. Hydrocyanic Dil. Lotio, Chloroform, Cremor Sicc. Preps., *Ung. Cocaina,* Perfumed Formosyls, *Plumbi cum Lacte Lotio, Sodii Carb. Balnea, Zinc and Starch Powder.*

Uterus, Catarrh of.—*See* **Catarrh, Uterine.**

Uterus, To cause Contraction of.—Borax, Caulophyllin, Cimicifuga. Cornutine, Ergota, Ergotin, Ergotinine, Ergotoxine, Ernutine, Gossypii Rad. Cortex, Hamamelis, Hydrastis, Pituitary Ext. Liq. (Posterior lobe), Saccharum, Sclerotic Acid, Ustilago Maidis.

Uvula, Relaxed.—*Gargles of Alum, Capsicum Tinct., Catechu, Ferric Chloride, Kino, Pigment of Glycerol of Tannin, Potass. Chloras, Rhatany, Kino or Tannin Lozenges, Zinc Sulphate* or *Zinc Chloride Gargle and Pigment.*

Vaccination, Dressing after.—Vaccination Shield, Picric Acid, *q.v.*

Vaginitis.—In simple vaginitis antiseptic drugs by vaginal injections may effect a cure, but in glandular erosions of the cervix or in infections of the cervical glands, the action is purely palliative only. Direct applications of strong *antiseptics, astringents, or caustics to the cervix,* on the other hand, in some cases may cure after a lengthy course of treatment. If there is no glandular proliferation and if the case is one of simple infection, then *Formalin Pyroligneous Acid, Nitrate of Silver, or Sulphate of Copper may be of use applied* through a cylindrical speculum, and the drug must reach not only the vaginal aspect of the cervix but the entire cervical canal.—Pr. Oct. 10, p. 451; *Zinc Ionisation.*

Varicella.

☞ Chicken pox is air borne—early in the disease, but it is difficult to determine the exact time it ceases to be so. It may uncommonly be conveyed by air on the third day, but apparently not afterwards. It is needless to keep chicken pox patients to end of the scabbing stage separate from others.—F. H. Thomson, L. i./16, 3411. See also Table of Diseases.

Vesicles should be painted with Iodine from the first; prevents scarring.—C. Corben, B.M.J. ii./19,135.

Varicose Ulcers.—Calcii Iodid. Locally *Allantoin*, Flavine. *See also* ULCERS.

Varicose Veins.—Tinct. Nucis Vom., Tinct. Hamamelidis in Spt., Lotion lightly rubbed on, see Tinct. Nucis Vom.

Variola.—Hydrarg. cum Creta (*q.v.*) 10 grains *ter die*, appears to abort.

Variola, To prevent pitting.—*Acid. Boric. Ung.*, *Acid. Carbolic Ol.*, *Amyli Gluc.*, *Argent. Nit.*, *Calcis Linim.*, *Collodium*, *Hydrarg. Ung.*, Iodine Dilute, *Phenol pure*, *Styptic Colloid.*, *Zinci Oleat. Ung.*

Vasodilators.—*Amyl Nitrite* Sterules, Benzoates, *Cinnamates*, *Coumarates*, *Erythrol Nitrate*, Hippurates, *Mannitol Nitrate Tablets*, *Nitroglycerin Tablets*, Sodium Nitrite, Spirit of Nitrous Ether, Thyroid Extract.

Venereal Diseases.—*See* **Syphilis, Gonorrhœa, Chancroid.**

Vermicides.—*See* PARASITES.

Vertigo.—Acid. Hydrobromic (with a little Quinine), Ammon. Spt. Arom., Auri Bromid., Caffeine, Guarana, Quininæ Valerian., Strychnine, Urea Bromine, Zinci Valerianas.

Treatment of auditory vertigo, L. i./10,355.

Vincent's Angina.

Two varieties of organisms are found in Vincent's angina—the *B. fusiformis* and Vincent's Spirochete. Two forms of Vincent's angina are met with (1) the pseudo-membraneous, resembling diphtheria in appearance, and (2) the ulcerative. In the first there are abundant bacilli mixed with cocci, and in the second associated with the bacillus, a gram negative mobile flagellated spirillum. A co-existing strepto. infection is not uncommon. The Ziehl Neilsen method is all that is required to stain, but the silver method shows the spirochetes more clearly.—J. C. Bouty, B.M.J. ii./17,685.

See also Throat, Spirochætal Ulceration, p. 1009.

Vincent's spirochætæ and Fusiform Bacilli—infection of mouth, eyes and penis. Mixture of Arsenic and Ipecac. as also the *Pigmentum Ipecacuanhœ et Arsenici* (*q.v.*) applied to the mouth, cleared up the condition.—F. B. Bowman, L. ii./17,536.

Salvarsan topically is better than a mixture of hydrogen peroxide, Ipecac. Wine and Glycerin.—B.M.J. ii./17,404.

Ulcerative gingivitis.—Vincent's Angina well treated by thorough irrigation with *Iodine* or *Arsenical* preparations—the former in preference.—J. F. Colyer, B.M.J. i./18,205. Better than Iodine may be to gargle with *Hydrogen Peroxide* 3 or 4 times daily and after every gargle to apply to the diseased spots a mixture of *Quinine Hydrochloride* with aqueous *Methylene Blue* 3 to 5%.—*ibid*, 220.

Voice, Loss of.—Cocaine, Cod Liver Oil Emulsion, Erysimum Syr., Lichenoids, Lysoform Pastils, Menthol, Ozonic Inhaler, Potass. Permang. Solube, or Solube Phenol, dissolved as gargle, Potass. Chlorate and Borax, Rhatany, Solube Borax Co., Throat Pastilli (Glycogelatin, *q.v.*), Tab. Formalin (to suck).

Amyl Nitrite and other Vasodilators with success in hysterical aphonia.—*Vide* Amyl Nit.

Vomiting.—Acetanilide, Allium Juice, Arsenic, Acid. Carbolic, Acid. Hydrocyanic. Dil., Ammon. Bromid., Beef Essence (Brand's), *Bisedia*, Bismuth preps., Calcii Chlorid., Calcis Aqua, Cerium Salts, Chloral, Chloroform preps., Coca and Cocaina. Elixir Gentianæ Acidum, Hydrarg. Perox. Ingluvin, Iodi Tinct., Liquor Sodæ Effervescens, Magnes. Carb. Liq. Morphinæ inj. hypod., Nitroglycerin. Nux Vomica, Potass. Bicarb. cum Acid. Citric Mist., Efferves., *Sedeff*, Sodii Phosph. Effervescens., Vin. Ipecacuanhæ in minim doses, Normal Saline per rectum.—B.M.J. i./05,1350. Of infancy, Sodium Bicarbonate; of Pregnancy, *see* **Pregnancy.**

Vomiting, Post Operative.—Chloretone. Cocaine subcutaneously. See also Vomiting if patient able to take internally. For vomiting after Chloroform,—a few drops of Chloroform on Sugar. See also p. 281.

Vomiting, Cyclic or Recurrent.—Glucose Injection. Rectal Feeding.

Cyclical Vomiting.—A brisk purge should be given at first, and if drowsiness increases an intravenous injection of Saline containing 1 drachm of Sodium

Bicarbonate to the pint. Alkalis and Glucose *per os* or subcutaneously to counteract acid intoxication.—F. Langmead, Pr. July, 1912.

Warts and Corns.—Lime Water internally, *Acid. Acetic Glaciale, Acid. Carbolic*, Carbonic Acid Snow, *Acid. Chromic., Acid Picric, Acid-Trichloracetic Collodium Callosum, Collodium Salicylicum, Collodium Salicylicum c. Acid, Lactic, Formalin*, Glyc. Papain, *Hydrarg. Nitras, Ol. Cinnamomi, Iodi Linim. Paraform Collodion, Potassæ Liquor*, Radium, *Liquor Sodii Ethylalis, Thuja* Magnesium, also Zinc Ions.

Warty Growths.—Radium.

Water Purification.—*Antityphoid Tablets, Copper*, Iodine, Permanganates, *Potassium Iodate, Sodium Persulphate.*

Wax in the Ears.—Hyd. Perox. or diluted c. equal vol. of Glycerin, m. and. for 3 days, syringing afterwards, Glyc. and Sod. Bic. Saturated Solution.

Whitlow.—Hydrog Perox.

Whites.—*See* **Leucorrhœa.**

Whooping-Cough.—Acid. Benzoic and Benzoates, Acid. Carbolic, Acid-Hydrocyanic Dil., *Adrenalin, Allii Succus*, Alumen, Amyl Nitris, Apomorphinæ Hydrochlorid. (minute doses), Atropine, Atropine Methyl Bromide, Auri et Sodii Chlor., Belladonna, Benzol, Bromides, Bromoform, Bryonia, *Caffeine Tri-iodide Pil.* (Billimoria), Calcis Aqua, Calc. Sulphid., Camphor Elixir, Camphora Monobrom., Cannabis, Chloral, Cocaine HCl. (*Has been advised on the basis of one grain thrice daily for an adult*), Codeine Jelly, Conium, Ergot, Gelsemium, Glycaphorm, Grindelia, Hexamethylenetetramine, Iodoform in Ether Injections, Ipecac., *Koumiss*, Lobelia, Morphine preps., *Ol. Succini*, Oxygen inhalation, and with Alcohol, *Ozone*, Ozonic Ether, *Papaverine Sulphate*, Phenacetin, Phenazonum, Potass. Bromid., considerable doses combined with Chloral Enemata, Quinine, Rubidium-Ammonium Bromide, Senega, Sodii Benzoas, Stramonium, *Syrup Thymi*, and Ext. Liq., Tab. Formalin (to suck), Vaccine B. Bordet-Gengou and Compound Whooping Cough Vaccine, Zinci Oxid. and Sulphas. *Thymaglycin*, 10 m doses for children diluted useful.

Inhalation of Acid. Fluoric., Ethyl Iodide from Sterule, *Formalin or Naphthalene, or Pyridine, Carbon Dioxide per rectum, Himrod's Cure, Hyoscyamus*, Pigmentum Cocaine et Hydrarg. Perchlor., *Succini Ol. as Liniment, Vapor Coninæ, Fumigate room with Sulphurous Acid, Resorcin as Nebula*, Trichloracetic Acid, Vapor and Liniment Terebeni.

To combat the infective factor T. Zagger recommended Quinine Hydrochloride in a 1 to 2 per cent. solution in doses of 2½ fluid drachms administered three times a day at 8 a.m., 2 p.m., and 6 p.m. To combat the nervous element simple hydropathic packs applied two or three times, especially towards the evening and night for from one to four hours. They should reach from the armpits to the knees and be covered with flannel, the temperature of the water being from 52° to 60° F. The sedative effect is remarkable. The result of this combined treatment has been satisfactory in many cases. The convulsive stage shortens to twenty, fifteen, and even ten days. There have been rarely more than twenty attacks of cough in twenty-four hours, and the number of attacks and their intensity decreased from day to day. There have been no fatal cases, no complications, and not one case of broncho-pneumonia.—B.M.J. ii./10,1135

Keep child at one temperature, avoid draughts, etc., and before each paroxysm give a full dose of Potassium Bicarbonate. Reduces cough remarkably.—B.M.J. ii./12,1088.

The best routine treatment is antipyrin (which may, if necessary, be combined with ammonium bromide or heroin). For a child six months old the dose is 1 grain every three hours, and then every two hours; for a child two years old, 2 gr. every four hours, and then every two hours. Should pneumonia set in, the antipyrin should be discontinued. . . . For older children, quinine in full doses, 12 to 15 gr. being given daily to a child of five. If paroxysms do not yield, the best drug is belladonna. It must not be given if the temperature is high or if serious complications are present, and to be of value must be pushed. A child of three may receive 10 m. of tincture of belladonna every four hours, and then every two hours if necessary, or $\frac{1}{600}$ gr. of atropine may be given in the same way, until the pupil dilates or delirium sets in, when its use should be stopped for a time and smaller doses substituted. Bromoform is advised by some (1 to 3 m. for two years, 2 to 4 m for five years, five times a day) Full doses only with caution: if in emulsion shake the bottle.—Latham's "Dictionary of Medical Treatment."

Small doses of *Iodine* have been given to infants in solution with good result. Iodoform has also been advised intravenously for the same purpose.—Pr. 89, 431. B.M.J. ii./12,681. See our p. 493.

Ferric Chloride, solution of 240 grains in one ounce of glycerin and water applied to the root of the tongue preferably to Trichloracetic Acid.—T. Mark Hovell, B.M.J. i./17,284.

Croton Oil 1 ounce, Cantharidin 3 grains, Strong Acetic Acid 1 drachm, Almond Oil to 8 ounces painted weekly back and front for whooping cough. Aborts within 14 days.—W. J. Midelton, i./16,374.

Worms (Intestinal):—

Ascarides (*Threadworms*).—Acid Carbolic 2 grains ½ hour *ante cib.* and Ung. Hyd. to rectum for a few nights. Aloes Vinum with Salt Enemata, Chenopodium Oil, *Enemata of Vinegar or of Aloes, Sodium Chloride, Salicylic Acid, Thymaglycin, Thymol or Quassia*, also Sansiviera Ext. Liq., internally, Quassia Suppositories, Ascarides, Toxic effects of.—L. ii./10,1715.

Chloroform 3 to 4 Gm. kills the parent organisms and prevents development of ova. May well be combined with *Castor Oil* or Olive Oil. Effective against ascarides, as also against *Ankylostoma, Oxiurides*, and *Tricocephalus*.

Ascaris Lumbricoides life history. When ingested by the mouth ascarids first develop into larvæ in the lungs and tracheæ of their hosts. An intermediate host (other animal, etc.) is apparently not needed for their development.—F. H. Stewart, B.M.J. ii./16,5; i./18,267.

Lumbrici (*Round Worms*).—Anacardium, Areca, Cambogia, Calomel, *Chenopodium, Azadirachta*, Jalap, Naphthalene, Santonin (with garlic draught), *Santoninoxim*, Scammony, *Spigelia, Sansiviera*, Conf. Santonin Comp., Turpentine.

Tœnia (*Tapeworm*).—Areca, Calomel, Cousso, *Embelia Ribes, Filicic Acid*, Filix Mas, Kamala, Mucuna, Oleum Terebinth c. Ol. Ricini. Pelletierine, *Pepo*, Thymol, Terebene.

Many of these may be prescribed in *Stearettes* or *Formagules*, *q.v.*

Wounds—Allantoin Dressings, Aseptafilm (applied as covering), Celloidin Solution, Collodions, Cyanide Paste, Formalised Gelatin, *Glucose Powdered locally*, Hydrogen Peroxide, Iodine Tincture for cuts and wounds, *Kelly's Paint*, Liq. Alum Acet., *Mastiche Benzol*, Petrolatum Iodi, Zinc Ions See also Antiseptics. Mercuric Chloride or Biniodide Lotion, *e.g.*, from a "Solube" 1 in 2,000, also Mercuric Chloride with respectively Ammon. Chlor. Pot. Chlorid. and Sod. Chlorid., Sterilised Dressings,—Bandages, Gauzes, Lints, Wools medicated with Boric Acid, Carbolic Acid, Iodoform, Mercuric Iodide, Mercuro Zinc Cyanide, Picric Acid, Sal Alembroth, Thymol Iodide, etc.

For Skin Sterilisation.—See Iodum, p. 503, *et seq.*

Wounds in War (caused by missiles) *within* 24 *hours* of their infliction. To attempt to disinfect a wound after 24 or 48 hours, or in which suppuration has begun, is a harmful procedure. After stopping bleeding with a tourniquet in the case of a limb, or clamps in the case of wounds in the trunk, cleanse the skin and surroundings with 1 in 20 Carbolic Lotion and Ether Soap, and then shave the part, again wash with the Carbolic Lotion and leave covered with a cloth saturated with the Lotion, while the interior of the wound is being attended to. This must be cleansed from blood, and portions of skin or fat visibly soiled by dirt or earth must be removed, the interior is then dried as completely as possible and liquid Carbolic Acid applied by means of a sponge to all the recesses, taking care not to run it on the skin. In cases of bad soiling it is well to wash out after five minutes, with 1 in 20 Carbolic Lotion *followed by Saline* and to apply the Acid a second or even a third time. Large wounds must also be so washed in order to get rid of excess of Carbolic and thus reduce risk of absorption. After disinfection is complete cover the wound with an *antiseptic*, not merely *aseptic* dressing, *e.g.*, Salicylic Wool, first protecting the skin by a layer of Cyanide Gauze. If Iodine were used the procedure would be much the same, but Sir W. Watson Cheyne thinks that it should be used much stronger than the ordinary 2% solution. Mercury salts are of little use in the presence of albuminous or oily fluids. Carbolic Acid or Iodine are not affected to the same extent, as they are soluble in oil, and on combination with Albumin are still active antiseptics. For shrapnel wounds suppositories or bougies containing Iodine and Phenol are advised.—B.M.J ii./14,865. Consult also Hunterian Oration.—Feb. 15, 1915.

The trend of treatment of wounds is towards antisepsis rather than asepsis,—the latter although ideal for operations under perfect conditions, *e.g.*, in civil hospital operating theatres is not suitable for warfare. G. L. Cheatle believes that Iodine has proved a failure in the treatment of wounds. He has made a solution which he considers is better than Iodine. IT IS A MIXTURE OF 1 IN 20 CARBOLIC ACID AND 1 IN 500 MERCURY PERCHLORIDE IN ABSOLUTE ALCOHOL COLOURED WITH ROSALINE. This solution is a solvent of fat by reason of the Carbolic and is also a powerful germicide. Wherever the dye is seen the Perchloride is present, even weeks after application. He disfavours Hydrogen Peroxide for constant application to wounds, the granulating tissue under its influence becomes anæmic and swollen. It may, however, have its uses in removing blood clot and sloughs.—B.M.J. ii./14,1006.

BISMUTH SUBGALLATE GAUZE is definitely inimical to sapraemic infection and quickly abolishes the fetor of foully septic wounds.—Lt. Col. E. A. R. Newman, B.M.J. ii./14,837.

Compresses of 60% Spirit (Methylated) have been the most effective dressings for badly lacerated shell wounds.—R. E. Kelly, B.M.J. ii./14,861.

Sponging with Solution of Carbolic Acid in spirit (1 in 12 or 15) has always given good results no matter what the extent of the exposed surface. It stops oozing and hæmorrhage. A small quantity poured over instruments in a tin and set light to, forms an efficient means of sterilising them in an emergency.—Stuart Oliver, B.M.J. ii./14,861.

Suppurating wounds have been treated by German surgeons with RAW TURPENTINE which is said to cause no pain or irritation. Pure Liquid Paraffin with or without the addition of 2 to 2½% of Iodoform has also been advocated for very septic cases.—B.M.J. ii./14,944.

Application of SALICYLIC ACID as such has been used for wounds (including shrapnel and bayonet) with excellent results.—A. Wilson, B.M.J. ii./14,998.

RÉSUMÉ OF PREPARATIONS USED TO WOUNDS IN THE WAR.

(This is not a complete List. Consult Index *for others*).

ACID CARBOLIC AND ACID CRESYLIC.

"Back to Lister."—A discourse on antiseptic surgery. Difficulties encountered in war surgery. Advocated application to dirt infected wounds of Lister's original method of purification by undiluted carbolic acid—it may cause slough, but it is so slight in degree as to be unimportant. The only way of destroying Tetanus and Gas Gangrene organisms and to deal with Streptococci is to use the most potent and safest antiseptic.—Sir Rickman R. Godlee, B.M.J. i./15,515. See also Gas Gangrene.

Sir Watson Cheyne pointed out that Lister's third plan of treatment of wounds (the processes of treatment being a matter of gradual evolution) was in addition to washing out the wound with 1 in 20 Carbolic Lotion, to clip away soiled tissues and apply undiluted carbolic to the parts. He has found this plan very satisfactory. For the *field* he suggests a fourth plan, viz., in addition to clipping away the soiled parts to apply undiluted Carbolic Acid to the whole surface of the wound opening it up if necessary.

Fleet Surgeon Bassett-Smith, A. Edmunds and Sir W. Cheyne investigated as to whether it is possible to introduce an antiseptic into a wound soon after its infliction, which would remain there, diffuse in the blood and tissues and inhibit growth of bacteria for a day or so until the wound can be thoroughly disinfected. Antiseptics in a fluid form will not remain in position. Ointments or pastes are the only feasible way and the best basis is Lanolin 6 parts and White Wax 1 part.

The diffusibility and antibacteric power of many preparations were determined by *Edmund's cell* (*q.v.*) 30% of Cresol was very marked in the results.

Iodine 6% was very poor (this strength is about the limit of toleration of Iodine on the skin), Paraform 5% good (probably also limit of toleration), Corrosive Sublimate 0·2% moderately good, Lysol 20% (*i.e.* 10% Cresol) very good—large clear area and as good as Carbolic 20%. Alcohol Absolute was useless. Origanum and Cinnamon Oils were good. Colloidals no good. Results with Tricresol practically the same as with Phenol—and quite constant. In less than three hours after inoculation colonies unless inhibited can be seen. The Phenolic series show small colonies, *i.e.* continuance of diffusion, which Paraform did not.

Experiments on animals infected with emulsion of *B. pyocyaneus* and then treated with Tricresol and Carbolic 30% respectively gave satisfactory results at 15 minutes' interval but not at 30 minutes. For use Tricresol or Carbolic Pastes suggested in 20% strength. They were worn on the skin by Mr. Edmunds for 24 to 48 hours and tolerated. Development of infection can be delayed for 4 to 5 days by these pastes provided they are put in early, *within* 15 *minutes*, and that the wound is cleansed out at the end of the time.—L. i./15,419.

Cresol Paste and Borsal were severely criticised by J. G. Saner.—L. i./15. 1225, *c.f.* our pages 10 and 33.

The suggestion was that Cresol Paste and Borsal should be used in the trenches or the vicinity as soon as possible after the infliction of the wound, and that when the patient was brought to the first convenient place the wound should be opened up, thoroughly cleaned out and disinfected with peroxide, carbolic acid, etc. The account includes statements of reports from Mr. Edmunds at the Dardanelles. Results were " excellent."

Cresol Paste had a distinct antiseptic action, and for shell wounds was admirable. The point is made that most men have been so impressed by their teachers with the dangers of antiseptics that they are timid of using any.—L. ii./15,213.

Lancet review says one school holds that the use of antiseptics is valueless or worse—on the other side stand those who hold that Lister's teaching is sound to-day.—L. ii./15,236,399. See also Editorial, B.M.J. i./15,813.

LISTER'S STRONG ANTISEPTIC MIXTURE. Carbolic Lotion 1 in 20 containing 1/500th part of Corrosive Sublimate.

Employed successfully for washing out recesses of wounds.—Arthur Edmunds, L. ii./15,216.

For casualty clearing station experience, see p. 16.

'PHENOLISATION.' Instantaneous treatment of Gas Gangrene wounds. Phenol 9 parts, Alcohol 1 part used to swab out wounds. Then irrigate with strong Alcohol (5 to 7 pints). Finally embalm with Mencière's Solution ('A'), *q.v.*

CARBOLIC ACID and CAMPHOR equal parts rubbed together till liquid overcomes sepsis; diminishes pain; no danger. Large wounds of all kinds treated.—I. Feldman & A. J. Walton, L. ii./16 1043.

Major Pearson says that Col. Gray and he gave this mixture and modification a prolonged trial at the front but abandoned it as a means of controlling infection. Efficient and adequate *mechanical* drainage is the one and only secret of success in dealing with infection. Once proper drainage is established, it is a matter of indifference whether one employs antiseptics or concentrated saline solution. The use of either does not appreciably affect the course of infection—with good drainage they are unnecessary; without it they are useless.—L. ii./16,1126.

ACIDUM HYPOCHLOROSUM. See p. 49, *et seq.*

Nature applies her antiseptic to an invaded tissue *from within* outwards. She assails with most vigour the van of the invading host—the most vigorous and active of the rapidly multiplying bacteria. The surgeon seems to be tied down to attack in the rear in the hope of overtaking the advanced lines of invaders! Carrel's method has given great success, but must be carried out with scrupulous care.—Sir A. Pearce Gould, B.M.J. ii./17,677.

ACID LACTIC.

Fermented Lactic Acid Cultures have been used to combat infecting organisms. See p. 72.

LACTIC ACID BACILLUS suggested as application to gun shot wounds. Suppuration in sloughing wounds is quickly removed. Produces no toxic effects, retards growth of pyogenic organisms (staphylococci, strepto. pyogenes B. Coli, etc.). A 2½% solution of milk sugar is made and a tube of Lactogen added to 20 ounces of the solution. Two ounces used for injection in bladder infections and retained as long as possible. The Lactic Acid produced is an excellent antiseptic and solvent of phosphates in cystitis.—D. Newman, L. ii./15,330.

ACID PICRIC. Dilute solutions applied on gauze or by syringing sinuses. 1% found too strong for the delicate epithelium of new skin. 0·5% and 0·2% were used when the granulation reached the level of the surrounding epidermis. Results uniformly good. It kills bacteria without corroding effect. Stimulates granulation. Has marked anodyne power. More efficacious than Iodine.—T. F. Brown, L. ii./16,433.

Picric Acid was used to burns in the Jutland battle.—*Vide* p. 76

Acid Salicylic. Effectual antiseptic for wounds. Gauze pads of Salicylic Acid as first dressing on the field advised.—A. Wilson, B.M.J. i./15,331.

Often successful in septic wounds where other antiseptics fail.—L. G. Anderson, H. Chambers and M. Lacey, L. i./16,1119. See p. 79.

Acriflavine. See p. 292, *et seq.*

Alcohol. See Spirit.

Antifebrin (Acetanilide) as dusting powder. See p. 1.

Allii Succus. See p. 777.

Argenti Nitras. Silver Nitrate in extremely dilute solutions, *e.g.* 1 : 200,000 or 1 : 500,000 sprayed on and wounds washed with same; excellent. Strong metallic solutions fail by creating necrosed tissues.—J. Danysz, Comptes Rend. 1915, per P.J. i./15,241.

'B.I.P.P.,' See p. 232.

The treatment of war wounds undoubtedly resolves itself into (1) the cleaning of the wounds and (2) the encouragement of healing. Antiseptics may arrest sepsis providing the organisms have not gained a deep entrance into the tissues. They may, however, affect the vitality of the tissues so that a further field is provided for the growth of organisms.—A. E. Morison, B.M.J. i./18,342.

The Morison treatment of wounds is thought to be the highest attainment yet achieved—it is a bold procedure to sew up a gravely infected wound and trust to the antiseptic. By it wounds can be sterilised and healed as if no infection had occurred.—Sir A. Pearce Gould, B.M.J. ii./17,677.

B.I.P.P. and Hypochlorite had not effected great diminution in anaerobic flora in war wounds. Immediate excision of lacerated tissues best.—Sir K. Goadby, B.M.J. i./18,581.

Borsal. See Acid Carbolic and p. 10.

Brilliant Green. See p. 309.

Calcium Peroxide. See Oxygen Yielding Chemicals.

Carrel-Dakin Method. See Acid. Hypochloros. *Vide* also our page 59.

Celluloid Splinting. See p. 345.

Chloramine 'T.' See p. 60.

Colloidal Metals. See Chapter on.

'Cyanide.' See Hydrargyri et Zinci Cyanidum.

Creosoted Oil (Liquid Paraffin), Calot's Form. See p. 627.

Dakin's Solution. See p. 57.

Drainage.—'Charcoal' or 'binding' wire—simply soft iron wire of various gauges coiled into spirals—has advantages over rubber drainage tubing in not being likely to block or get flattened in a wound which has to be drained.—F. H. Pott, L. i./15,1153.

Ether as antiseptic successful. Swab out thoroughly.—J. Livingston, B.M.J. i./15,398. No watery solutions to be used beforehand, afterwards Iodine used. Also 2% solution in lukewarm water. Ether has marked stimulating power on cells. Undiluted it might have deleterious effect.—A. Distaso and T. R. Bowen, B.M.J. i./17,259.

Ether used by Carrel-Dakin Method. See p. 111.

Eupad. See p. 53.

Eusol. See p. 51.

Glucose. See p. 425. It has greater osmotic power than Saline.

Gum Acacia with Saline. See p. 771.

Hydrargyri Cyanidum. Subconjunctival injections save sight in cases of injury of the eye from shrapnel wounds, also in diseased conditions of the interior of the eye; in most choroidal and ciliary disorders and in some forms of retinitis it is eminently useful. 10 minim doses of a mixture of equal parts of 0·1% solution and 1% solution of Amydricaine (Alypin) or Guanicaine (Acoin)—mixed at time of use, increasing dose by 5 minims each time to 30 or 40 minims.—P. A. Harry, Pres. June, 1915,113.

Hydrargyri et Zinci Cyanidum. Cyanide Gauze.

'Quite good for visible clean wounds.'—A. Don, B.M.J. i./16,648.

Dry Cyanide Gauze is also excellent for 'suppurating abrasions, boils and skin affections.'

Hydrion Tablets (Mercuric Chloride, etc.). See p. 465.

Hydrogen Peroxide.

Is good to clear a cavity or surface, but not good as a wet dressing on gauze. —A. Don, B.M.J. i./16,648.

'Peroxide Carbolic.' Four-hourly irrigation with Hot Peroxide Solution 2 oz. to the litre followed instantly by Hot Carbolic Solution ½ oz. to the litre. Results in infected wounds superior to application of hot fomentations with Perchloride dressings wrung dry.—J. O'Conor, B.M.J. ii./15,755.

Hot Peroxide Lotion irrigation, then 1 in 100 Hot Carbolic irrigation and hot (1 in 2,000) Mercuric fomentation.—J. O'Conor, L. ii./15,253.

Peroxide is specially useful for gas gangrene infected and Tetanus infected wounds.

ICHTHYOL 10 to 20% in Glycerin efficient spread on lint used for opening superficial abscesses instead of Boric fomentations. Does not adhere to the wound.—G. G. Alderson, L. i./16,749. Successful; Ichthyol is non-irritant. The Glycerin is good for its osmotic action.—C. W. Duggan, B.M.J. ii./16,74.

For septic wounds with severe suppuration and sloughing accompanied by œdema and induration of surrounding tissues. Osmotic action of the glycerin useful to prevent absorption of toxins and destroy invading germs. Magnesium sulphate also helps osmosis. Solution of it with glycerin efficacious, as suggested by Major Duggan.—Maj. T. W. A. Daman, B.M.J. ii./16, 646.

HYPERTONIC SALINE. See SALINE and p. 699.

IODINE. Wounds in naval warfare are frequently septic owing to the circumstances. In the 'Tiger' routine practice was first to wash with soap and water. After removing all foreign matter to dehydrate by flooding with S.V.M. and then sponge with 10% dilution of Tincture of Iodine in Methylated Spirit and insert drainage tubes and then cover with gauze.—B.M.J. ii./16,598

An opinion has been expressed to the effect that its use is irritating, and the pain continues for some time, but we do not think this is generally acknowledged. See lengthy account, p. 503 and 504.

IODINE STERILISATION OF SKIN, p. 503.

IODOFORM, as in MENCIÈRE'S SOLUTION, p. 494.

IONISATION of Sodium Salicylate and other chemical compounds has been recommended.

LACTIC ACID. See ACID LACTIC.

LAUDANUM has been used by the Greeks.

MAGNESIUM CHLORIDE. Solution of the anhydrous salt 1·2% or 1·8% of the crystalline salt. Dressings dipped into this and applied to wounds. Cicatrisation rapid.—L. ii./15,941.

MAGNESIUM SULPHATE SOLUTION. Magnesium Sulphate 40, Glycerin 10, and water 30 sterilised. Good for its osmotic property to cleanse wounds. Used where neither asepsis possible nor antiseptics of any service.—Morison and Tulloch, B.M.J.E. i./16,2.

MAGNESIUM SULPHATE CREAM and Solution for osmosis, *v.* p. 532.

MALACHITE GREEN (and with Mercuric Chloride). See p. 308.

MENCIÈRE'S SOLUTION. See p. 494.

MASTISOL AND MODIFICATIONS. See p. 808.

MERCURO-ZINC CYANIDE. See HYDRARG.

OXYGEN YIELDING CHEMICALS, *e.g.* CALCIUM PEROXIDE and SODIUM PERBORATE for soil contaminated wounds. Recent soil-contaminated wounds may well be treated with thorough insufflation of the latter—repeated at 24 hours' interval.—A. G. R. Foulerton, L. i./15,484.

PARAFFINUM LIQUIDUM. See p. 627. With IODINE. See p. 505.

PARAFFINUM DURUM (Medicated), melted for burns. See p. 624.

PEROXIDE OF HYDROGEN. See HYDROGEN PEROXIDE.

PEPSIN. Contused wounds of a few days' standing if sloughing is suspected should be injected with Glycerin of Pepsin. Superficial sloughs may be covered with three or four thicknesses of unmedicated lint well soaked in the pepsin solution or perhaps in a mixture of pepsin and water. A treatment evolved by consideration of the peptic ulcer. The gastric juice will digest tissue that is dead without involving that through which the blood still circulates.—R. W. Leftwich, L. ii./17,510.

PETROL excellent for cleaning wounds, especially dirty wounds, particularly the depths of wounds. Does not cause any special smarting.—M. H. Embree B.M.J. ii./16,327.

PHENOL. See ACID. CARBOLIC.

PORTLAND CEMENT. See p. 137.

POTASSIUM PERMANGANATE overcomes sloughing and useful in tetanus. *Powdered* applied to wounds; quickly cicatrized; non-toxic; antiseptic action durable. Destroys bacteria and protects against anaerobes.—B.M.J.E. i./16 8.

QUININE HYDROCHLORIDE 1% Solution as wet dressing (continuous drip) stated to be ten times as effective as Phenol against *B. Aerogenes.*

SALINE, HYPERTONIC. See p. 699.

In practice results have varied.

W. Parry Morgan's criticisms: 5 per cent. salt solutions do not draw lymph by osmotic forces. An account of numerous experiments with bacteria in pus in the presence of a strong proportion of antiseptic, for example Mercuric Salts 1 in 200, carbolic acid 1 in 60, Iodine 1 in 200. For washing out a wound where the antiseptic would be in excess Hypochlorous Acid solutions are potent and carbolic acid comparatively weak. On the other hand, for application in a dressing when the pus tends to be in excess, hypochlorous acid solutions are practically useless, whilst phenol, although having the disadvantage of interfering with leucocytes, is fairly efficient.—B.M.J. i./16 685. D'Este Emery's criticism of the latter.—*ibid.*, 689.

SALT PACKS. *c.f.* Hypertonic Saline, pp. 699,700.

SALT SACS in gauze as packing of gunshot wounds. (Colonel Gray originated the modification of Sir A. E. Wright's hypertonic method by using salt in form of tablets.)—A. J. Hull, L. i./16,1077.

Gum Arabic 6% solution with saline advised for intravenous use in shock. See p. 771.

SAPO MOLLIS. 2½% as wound dressing by Carrel method. Wounds clean quickly. Dressing only needs changing every three or four days.—R. G. Dixon and H. T. Bates, L. ii./17,789.

SCARLET R. See p. 304.

SINCLAIR'S GLUE. See p. 802.

SODII FLUORIDUM. See p. 773.

SODII PERBORAS. See Oxygen yielding chemicals, *antea.*

SPHAGNUM. See Chapter on.

SPIRIT-GLYCERIN. See p. 119.

TETHELIN has been suggested to stimulate granulation. See Thyroid.

UREA is a bactericide—readily kills non-sporing bacteria, also effectua in presence of blood. Clinically these results showed in use that it is quite non-toxic to wounds. Used as a liberal dusting powder. Advised for first aid.—W. St. C. Symmers and T. S. Kirk, L. ii./15,1237.

VACCINES AND SERUMS. See Chapter on.

Vaccines of value in treatment of wounded. *Streptococci* (numerous varieties), (initial dose 1 to 2 mill.), *B. Coli* (initial dose 30 mill.), *Coliform bacilli, B. proteus, B. pyocyaneus, Staphylococcus Albus* and *Aureus* (initial dose 30 mill.). Interval 5 days.—H. L. Tidy, L. ii./15,326.

Vaccine as advised by Sir Kenneth Goadby (*Proteus* and mixed *Streptococci*). These organisms pave the way for the anaerobic gas forming organisms.—R. H. Jocelyn Swan, L. ii./16,859. See also Gas Gangrene.

X.Y.Z. PASTE. See p. 532.

ZINC CHLORIDE prevents putrefaction—advised.—G. T. Beatson, L. ii. 15,1214.

Field Hospital work: Hot water bottles, an enema of coffee and brandy, a quarter grain of morphine and a pair of subcutaneous needles delivering really hot saline will carry through a serious operation a patient who half an hour before was cold and pulseless. The infection of wounds is due to a large degree to saprophytes. A liberal use of Hydrogen Peroxide will destroy most of the organisms. (This does not refer to the organisms of Gas Gangrene and Tetanus.) Dum-dum bullets not used by opponents. The pointed bullets used by the Germans with centre of mass far back gives the same effect—an ingenious advance on the dum-dum causing extensive laceration especially in the abdomen. Immediate laparotomy imperative in practically every case of abdominal wounds.—J. H. Beavis and H. S. Souttar, B.M.J. i./15,64.

Influence of Antiseptics on activities of Leucocytes and on healing of wounds. In the routine conversion of infected into sterile wounds in the great war one is struck by the fact that nature carries out the immunising process rapidly and efficiently in some cases, but not in others. One cannot distinguish beforehand those cases in which it will succeed from those in which it will partly or completely fail.—C. J. Bond, B.M.J. ii./16,861.

Résumé of developments in methods of wound treatment.—A. W. Mayo Robson, B.M.J. i./18,1.

Latent Infection of Healed Wounds.—Report to Med. Res Com.—Sir Kenneth Goadby, L. i./19,879.

It is not so much the dressing as its intelligent use that matters.—A. Don, B.M.J. i./17,648.

Yaws.—Organic Arsenic Compounds.
Yellow Fever.—*See* Vol. II.
Zoster.—*See* Herpes.

ANTIDOTES TO POISONS.

This list of Poisons and their Antidotes briefly outlined (the majority being more fully described in the text) will be an aid to the practitioner, when called to a case of poisoning, in assisting to determine: (1) The poison, if unknown, by taking the possibilities of the case into account. (2) The appropriate immediate antidotal treatment.

Acetanilide.—*Emetics. Inhalation of Ether and Oxygen.—Stimulants, e.g. Strychnine.*

Acetylene.—*As* **Carbon Monoxide.**

Acid Carbolic—*Magnesium Sulphate or Sodium Sulphate (latter in preference)* $\frac{1}{2}$ *oz. in* $\frac{1}{2}$ *pint or more of warm water. Soft stomach tube with utmost caution. Apomorphine as emetic, but it does not always 'act.' Egg White, Stimulants, Oil, Weak Iodine Tincture, within limits give same quantity of Tincture of Iodine as of Liquid Phenol taken, Saline transfusion. See p.* 14.

Acid Carbolic burns on skin, see **Burns** Therap. Index.

Acid Cresylic, *see* **Acid, Carbolic.**

Acid Hydrochlor—*Alkalis, Chalk, Carron Oil.*

Acid Hydrocyanic. *Symptoms*.—*Giddiness, staggering, insensibility eyes fixed and glistening, pupils dilated, violent gasping for breath, panting respiration. The poison is readily eliminated by the breath so if life can be maintained for even half an hour recovery is almost certain. Inhalation is equally as dangerous as swallowing or even local application or dropping in the eye.*

Stimulants, Ammonia (inhale), Sal Volatile ad. lib. If patient cannot swallow give brandy as enema or hypodermically. Alternate hot and cold douches, artificial respiration about 20 *in the minute, stomach pump or if time Mustard Emetic, Atropine hypodermically, or* 30 *drops of Tinct. Bellad. per os., repeated if necessary.*

Acid Nitric.—*As* **Acid Hydrochlor.**

Acid Oxalic.—*Apomorphine, Saccharated Lime Solution, Castor Oil.*

Acid Phosphoric.—*As* **Acid Hydrochlor.**

Acid Sulphuric.—*Magnesia and other alkalis (Chalk), Carron Oil.*

Aconite.—*Apomorphine, Stimulants, Amyl Nitrite, Atropine Sulph. grain hypod. Digitalis Tincture,* 20 *minims hypod.*

Aconite and Belladonna *(as Liniment).—Emetics, Stimulants freely —if not retained, dilute and give per rectum.—Murrell.*

Æthyl Chlorid.—*Weak Ammonia Vapour. Hot flannels to heart. also* p. 113, or proceed as under Chloroform, p. 281.

Alcoholism Acute.—*Empty stomach by syphon or stomach-pump or injection of* $\frac{1}{10}$ *grain apomorphine, wash out and fill with strong coffee, Amyl Nitrite Inhalation, heat to extremities, counter-irritation and injection of* $\frac{1}{10}$ *grain Strychnine.—Whitla Pract. Med. Powdered charcoal ad. lib. in water is efficacious.—Murrell.*

Alcohol Methylic.—*Brandy, Strychnine, Coffee (rectal injections if acute).*

Alkalis Caustic.—*See* **Potash Caustic and Ammonia.**—*Amylum Iodatum.*

Alkaloids.—*Emetics, Tannic Acid, Potass. Permanganate, Amyl Nitrite. See also alkaloid in question.*

Charcoal, a tablespoonful or larger doses frequently repeated, Garrod has shown, are antidotes against most active vegetable poisons, as Opium, Nux Vomica, and Aconite, for charcoal seems to have a special attraction for alkaloids: Animal charcoal is the best form.—Hale White. It should be given at once suspended in water and pumped out again. The absorption is almost instantaneous. Afterwards rinse out with water containing the ordinary antidote, and then a suspension of Charcoal and Magnesium Sulphate if a purge is not contraindicated. Charcoal suspension may be repeated several times. Has also been used in Phosphorus, Mercuric Chloride, Paris Green and Phloroglucin poisoning.—O. Adler, Wien Klin. Woch., per P.J. ii./12,98.

Ammonia.—*Vinegar well diluted, Lemon or Orange Juice, Acetic Acid, Amylum Iodatum, Tracheotomy may be necessary. Bronchitis kettle, Morphine.*

Amygdalæ Amaræ Oleum Essentiale *vide* **Acid Hydrocyanic.**

Aniline.—*Emetics, artificial respiration, fresh air, oxygen, bleeding or transfusion.*

Antifebrin.—*See* **Acetanilide**

Antimony Compounds.—*Stomach tube (but not for Caustic Compounds, e.g., Butter of Antimony) emetics, Tannin or tea, Stimulants, Morphine when symptoms subsided.*

Antipyrin.—*See* **Phenazone**

Aqua Fortis.—*As* **Acid. Hydrochlor.**, *q.v.*

Arsenic.—*Emetics, Antidotum Arsenici. Liquor Ferri Dialysatus ad lib. or Magnesia ad. lib.*

Atropine.—*Emetics, stimulants with Morphine or Pilocarpine,* $\frac{1}{2}$ *grain repeated.—Murrell.*

Barium Chloride.—*Sodium Sulphate.*

Battery Fluids.—*See* **Acid Sulphuric.**

Battley's Solution.—*See* **Morphine.**

Belladonna.—*See* **Atropine.**

Benzol.—*Emetics, Artificial Respiration, Douche with alternately hot and cold water over chest from a height, Stimulants.—Murrell.*

Biniodide of Mercury.—*e.g., in Antiseptic Tablets taken in error.—See* **Hydrargyri Potassii Iodidum.**

Blistering Fluids.—*As* **Cantharides.**

Bromine.—*See* **Chlorine.**

Butter of Antimony.—*Vide* **Antimony.**

Butyl-Chloral Hydrate.—*Emetics, Caffeine, Coffee, Atropine.*

Caffeine.—*Stomach tube, Emetics, Nitroglycerin, Apomorphine. Hypodermic Injection of Morphine* $\frac{1}{2}$ *grain with Atropine* $\frac{1}{50}$ *grain. See also* p. 244.

Calabar Bean.—*See* **Physostigma.**

Camphor (*and Camphorated Oil*).—*Emetics, Stimulants, Caffeine injection;*

Cannabis.—*Stomach tube, Emetics, Stimulants, Artificial respiration.*

Cantharides.—*Stomach tube, Emetics, White of Egg—no fat. Morphine if much pain.*

Carbolic Acid.—*See* **Acid Carbolic.**

Carbon Monoxide and Dioxide.—*Artificial respiration, Oxygen, Stimulants.*

Carbonic Oxide poisoning.—Bleeding recommended in all cases unless contraindicated by the general condition.—Pr. March, '13,638

Caustic Potash, etc.—*See* **Potash.**

Chloral and Chloralamide.—*Keep patient awake, Strong Ammonia to nostrils, stomach tube or emetics followed by Amyl Nitrite, Coffee, Oxygen, Picrotoxin, Strychnine* $\frac{1}{25}$ *grain. Artificial Respiration on slightest sign of failure continued some hours if necessary.*

Chloral and Morphine (*Combined*).—*Stomach pump or emetic, arouse patient, but not walk about. Ammonia to nostrils, cold then warm douche to head and chest. Atropine* $\frac{1}{25}$ *gr. hypod. repeated. Strychnine* $\frac{1}{25}$ *gr. hypod. if Chloral symptoms predominate.—Murrell.*

Chlorine and OTHER IRRITANT GASES.—

ALCOHOL (*Whisky, Brandy, etc.*) *to be inhaled from a cloth soaked with it as with Ether in addition.—Brunner Mond's suggestion. R. Parker, B.M.J.* i./15,102.

SODIUM BICARBONATE *about* 10% *solution inhaled through a respirator better than alcohol per os, and in any case the physical difficulty of drawing air through moistened respirators is a drawback.—J. C. McWalter, B.M.J.* ii./15,118.

OXYGEN *subcutaneously into loose tissue, e.g., of the flank from a cylinder dvised. When a swelling such as would be formed by* 300 *Cc. of saline has owly appeared repeat elsewhere.—J. D. Mortimer, B.M.J.* i./15,1028.

OXYGEN *treatment by passing a tube connected with a gas cylinder to the back of patient's mouth and opening and shutting the tap about* 15 *to* 16 *times a minute. The sharp, rhythmical inhalation produced by the pressure found effectual.*

For the cardiac weakness subcutaneous injections of CAMPHORATED OIL *in arge doses—5 Cc. to 15 Cc. every 24 hours.—Chassevant, B.M.J.E. i./17,15.*

Suggestion to draw over the patient on stretcher a balloon say 10 ft. by 4 ft., tying up the end and then distending with oxygen. Atropine not found of service. EMETICS *have proved useful. ½ pint of* SALT AND WATER *or 8 grains of* COPPER SULPHATE *followed by large draughts of lukewarm water.—Leonard Hill, B.M.J. ii./15,801.*

AMMONIUM CARBONATE 10 *grains in* 2 *ounces of water gave good results. The administration of Ammonium Carbonate is useless, as the evil on the mucous membrane is done past repair. Further* ***oxygen only acts as an irritant.*** PILOCARPINE *should be injected to promote shedding, of the epithelium—if this is not efficacious use* POTASSIUM IODIDE. *Simultaneously Morphine.—J. B. Berkart.*

LIQUOR ATROP. SULPH. 9 *minims, Water to* 6 *ounces. Dose.—½ ounce. Remove tightness across chest.—I. C. Tengely, L. i./15,1203. c.f. L. Hill above.*

WARM AQUEOUS VAPOUR *is a good sedative. Subsequently ordinary methods of treatment of acute bronchitis.*

SODIUM HYPOSULPHITE *in respirator solution, p.* 99.

VENESECTION *for chlorine poisoning advised.—Sir E. Sharpey Schafer.—B.M.J. i./16,774.*

Successful. Cyanosis and congestion relieved.—A. S. Hebblethwaite, ibid. ii./16,107.

Chlorine poisoning. Three cases.—E. Bigg.—L. ii./16,341.

Experimental.*—Immediate effects of Chlorine inhalation. Even with* 1% *the results are serious. Causes obstruction of the pulmonary vessels. Experiments on cats.—Sir E. Schafer, B.M.J. ii./15,245.*

Atropine injections, experimental to determine whether of value to those suffering from effects of irritant gases. Treatment should be as early as possible. Rabbits received from 2·5 *to* 4 *mgr. given in three, four or five separate injections, the first being intravenous, but note that herbivora have a peculiar tolerance to Atropine.—D. V. Cow, L. i./15,1147. See also ibid,* 1203.

Action of Chlorine on the Blood. The albumin is precipitated by bubbling the gas through the blood and the iron in the hæmoglobin is converted into Ferric Chloride. Inhalation of 2% *spray of Sodium Hyposulphite with a little Sodium Carbonate as antidote suggested for gas attacks.—H. Wilson Hake.—L. ii./15,78.*

Fumes from **Explosives** *in mines, accidents from.*

In all cases first produce emesis (APOMORPHINE HYPOD.), *then stimulants,* AMMONIA *or preferably* PITUITRIN. See *L. G. Irvine, B.M.J. i./16,162.*

Dichlor-ethyl-Sulphide (MUSTARD GAS, YPERITE), **Phosgene,** *and other gas poisonings.—B.M.J. ii./18,138.*

The first mentioned, though usually called a gas, is in reality an oily liquid which rapidly soaks through clothing and causes intractable blisters most difficult to heal. The effect is a delayed one, and is more marked on moist surfaces, e.g., from perspiration at the axillæ and fork. We had occasion during the war to make preparations to be used to counteract effects—an OINTMENT OF CHLORINATED LIME *seemed best. Iodine, Picric Acid, and others were tried.*

Details of treatment of burns and chest affections caused by mustard gas.—L. i./19,471.

Bromine.*—Note on symptoms and treatment with animal expts.* STRAMONIUM *fumes good.—W. L. Symes, B.M.J. ii./15,12.*

Nitrogen Peroxide *and other gases.—*SODIUM CARBONATE 20% *solution useful.—L. ii./15,198.*

Dermatitis caused by powder from bombs dropped in London. In nearly every case the eruption started on the ninth day after contact.—J. H. Sequeira, B.M.J. i./17,894.

Chlorodyne.*—As* **Morphine,** *q.v.*

Chloroform Inhalation.*—Amyl Nitrite, Artificial respiration—see* p. 281. *Inversion of the body.*

Chloroform (*Swallowed*).*—Amyl Nitrite. Stomach tube or Emetic. Large draughts of water containing Sodium Carbonate, say* 1 *drachm in* 1 *pint. Lavage with warm oil, e.g., Olive, Almond, Sesame, then Saline transfusion.*

Coal Gas.*—As* **Carbon Monoxide.**

Cocaine.—*Amyl Nitrite, Ether hypodermically* (5 *minims*). *Strichnine. hypod.*

Codeine.—*As* **Morphine**, *q.v.*

Colchicum.—*Evacuate the stomach, Demulcents, White of Egg. Stimulants*

Colocynth.—*Spirit of Camphor, Laudanum, Stimulants.*

Conium.–*Stomach tube, Emetics, Tannin, Stimulants and Artificial respiration*

Copper Salts.—*Stomach tube, Emetic, White of Egg, Milk. hot fomentations to stomach.* (*For quantities of fatal doses of Chloride and Sulphate see* p. 380.)

Corrosive Sublimate.—*See* **Hydrargyrum.**

Creosote.—*As* **Acid Carbolic**, *q.v.*

Curare.—*Artificial respiration, Stimulants freely—see text.*

Cyanides.—*See* **Acid Hydrocyanic and Potass Cyanide.**

Digitalis.—*Emetics, Aconitine Nitrate* $\frac{1}{120}$ *grain hypod,—repeated in* $\frac{1}{2}$ *hour. Tannin, Camphor, Nitroglycerin, recumbent position.*

Dover's Powder.—*As* **Morphine**, *q.v.*

Emetics.—Ipecacuanha in powder or wine. Emetine. Apomorphine ($\frac{1}{10}$ to $\frac{1}{4}$ grain hypodermically),strong Salt solution (tepid). Olive oil, Copper sulphate (2 to 8 grains), Tartar Emetic ($\frac{1}{2}$ to 1 grain), Mustard and Water.

Ergot.—*Stomach Tube, Emetics, Purgation with Castor Oil or Mag. Sulph. Tannin, Stimulants, e.g., Amyl Nitrite, Nitroglycerin* $\frac{1}{50}$ *gr. Patient to lie down.*

Exalgin.—*As* **Acetanilide.**

Foxglove.—*See* **Digitalis.**

Fungi.—*A large proportion of deaths are due to Amanita phalloides, which peels like a common mushroom, but has bulbous part at base of stem, also yellowish green colour at edges and white gills; it grows beneath trees; the poison is a toxalbumin.—Phallin, not an alkaloid. Ford believes the substance (which has haemolytic action) is a glucoside.*—B.M.J. ii./06,1540. *Stomach pump and Emetics, Castor Oil, Atropine and Belladonna, Brandy, Spirit of Chloroform, Sal Volatile, Morphine for the pain, and administer normal Saline. Potassium Permanganate has been suggested to decompose any Phallin left in the stomach.*—B.M.J ii./05,541.

Ipecacuanha is best emetic (25 grains). On no account give Tartar Emetic where there is contraction of jaw muscles, or in the case of children. Apomorphine $\frac{1}{3}$ gr. (or $\frac{1}{20}$ grain or less for child) may be preferable.

Promote free vomiting by strong tepid salt solution. Any purgative (not senna or jalap).

If delirium and convulsions set in ether or chloral may be necessary (the latter may also be given in Enemata). Finally for abdominal pain Morphine or opium, but always begin with an emetic.—M.P Oct. 13/09,398.

Gases, Asphixiating, to Counteract, *see* **Chlorine** also **Carbon Monoxide, Nitrous Oxide.**

Gelsemium.—*Emetics, Atropine or Strychnine hypodermically, also Nitroglycerin or Amyl Nitrite; Artificial respiration, Stimulants.*

Hydrargyrum (*Mercurial Salts*).—*Emetics, Apomorphine, White of one Egg for every* 4 *grs. of Perchloride* (*avoid excess*). *Reduced Iron, Alcohol or Ether for collapse.* (*Carron Oil made with Cod Liver Oil was given on one occasion where* 43½ *grains had been taken.*) Charcoal, *c.f.* Alkaloids. See also p. 461.

Hydrarg. Potass. Iodide (*Biniodide Antiseptic Tablets taken in error*).—*Olive Oil, Milk, White of Egg, Petroleum Emulsion, warm draughts.—See p.* 458.

Hyoscine.—*Emetics, Pilocarpine Injection.*

Hyoscyamus.—*Vide* **Atropine.**

Hypnotics.—*Vide* **Drugs in question.**

Iodum.—*Stomach tube, Emetics* (*Apomorphine*). *Starch, Saccharated Lime Solution, or Sodium Hyposulphite. Demulcents—finally Opiates.*

Jaborandi.—*Murrell says Atropine* $\frac{1}{50}$ *grain hypodermically or* 30 *minims of Tincture of Belladonna at once arrests symptoms.*

Laudanum.—*As* **Morphine**, *q.v.*

Lead.—*See* **Plumbum**

Lunar Caustic.—*As* **Silver Nitrate.**

Lysol.—*See* **Acid Carbolic.**

Matches.—*As* **Phosphorus.**

Mercury.—*See* **Hydrargyrum.**

Monkshood.—*See* **Aconite.**

Morphine.—*Emetic first* (*Apomorphine* $\frac{1}{10}$ *grain,—vomiting is induced with difficulty*) *then stomach tube even if Morphine taken hypodermically. Wash out stomach with Potass. Permang.* 2 *to* 5 *grains in the pint of Tepid Water*

(Morphine, injected subcutaneously is excreted into the stomach and then re-absorbed. Osler, Vol. I.). Saline Transfusion, Stimulants. Hot and cold Water poured on head alternately, drying in intervals. Ammonia to the nose, Strychnine, Atropine, $\frac{1}{20}$ grain hypodermically, or if not at hand 30 m Belladonna Tincture fvr every grain of Morphine, artificial respiration or Oxygen if necessary.—Murrell. Carbo Animalis often repeated c.f. Alkaloids.

Mushrooms.—*See* **Fungi.**

Mustard Gas.—*See* **Chlorine.**

Nepenthe.—*See* **Morphine.**

Nickel.—*See Vol. II.*

Nicotine.—*See* **Plants, Unidentified.**

Nightshade.—*See* **Atropine.**

Nitrobenzol.—*See* **Oil of Mirbane.**

Nitrous Fumes.—*See* **Carbon Monoxide** and **Chlorine.**

Nitrous Oxide (*Dental*).—*Vide page* 139.

Nux Vomica.—*See* **Strychnine.**

Oil of Mirbane.—*Copper Sulph.*(2 *to* 8 *grains*), *or other Emetics, Stimulants Atropine, Artificial Respiration, Calomel, Bismuth.*

Oil of Vitriol.—*See* **Acid Sulphuric.**

Opium.—*See* **Morphine.**

Paraldehyde. *See* **Chloral.**

Paregoric.—*See* **Morphine.**

Paris Green.—*Charcoal, c.f. Alkaloids.*

Petrol Poisoning.—*Fresh air and warm. Camphor injections, Oxygen.*

Phenazonum.—*Brandy, Ether, Strychnine, Oxygen.*

Phloroglucin.—*Charcoal, c.f. Alkaloids.*

Phosgene.—*See* **Chlorine.**

Phosphorus.—*Oil of Turpentine Potass. Permang. Solution* 1% *per os Murrell advises* 3 *grains Copper Sulphate every five minutes until vomiting is induced. To be continued* 1 *grain every fifteen minutes with a little Morphine if rejected. Epsom Salts as purgative. Charcoal. c.f. Alkaloids*

Physostigma.—*Emetics as Mustard, Zinc Sulphate, Apomorphine, Pot. Permang. by stomach tube. Atropine* $\frac{1}{50}$ *grain, or in bad cases Strychnine* $\frac{1}{12}$ *grain hypodermically, stimulants freely.*

Pilocarpine.—*See* **Jaborandi.**

Pit Gas.—*See* **Carbon Monoxide.**

Plants, Unidentified.—*Stomach tube, Emetics, Aperients, Treat symptoms, Artificial respiration.*

Plumbum.—*Emetics (Zinc Sulphate or Ipecacuanha) stomach tube, dilute Sulphuric Acid* $\frac{1}{2}$ *drachm in water; Magnes. or Sodium Sulph., Poultices to abdomen; Morphine hypodermic injection for pain. See also Plumbum in text.*

Potassium Bichromate.—*Emetics, Mag. Carb., Barley Water, Arrowroot or thick Gruel and stimulants.—Murrell.*

Potash, Caustic.—*Dilute Vegetable Acid, Fixed Oils.* **Not** *stomach tube.*

Potassium Chlorate.—*Stomach Tube, Emetics.*

Potassium Cyanide.—*Ferrous Sulphate Solution, large draughts, stomach tube, Emetics, Stimulants, Artificial respiration.—See also* **Acid Hydrocyanic.**

Adrenalin given at once, it is said, will tend to recovery (experiments on animals). Stated to have effect on the stomach or absorbing viscus.

Martin's Antidote consists in formation in the gastro-intestine of Prussian Blue. Thus 30 Cc. of Ferrous Sulphate Solution 23% strength, 30 Cc. of Caustic Potash 5%, and 2 Gm. of Magnesia: the two former to be kept in sealed ampoules, to be mixed and taken immediately.—B.M.J. i./13,271.

Potassium Nitrate.—*Stomach tube or Emetics, Mucilaginous Drinks, White of Egg, Stimulants, Atropine if sign of heart failure.*

Ptomaines.—Finely powdered Charcoal is suggested as a suitable antidote after eating tainted or suspicious food.—B.M.J. ii./11,1367.

Rat Paste.—*See* **Phosphorus** *or* **Arsenic.**

Red Precipitate.—*As* **Hydrarg.** *Give White of Egg freely.*

Salt of Sorrel *or* **of Lemons.**—*See* **Acid Oxalic.**

Savin.—*See* **Plants, Unidentified.**

Scopolamine.—*See* **Hyoscine.**

Sewer Gas.—*See* **Carbon Monoxide.**

Sheep Dip.—(?) **Arsenic.**

Silver Nitrate.—*Common Salt in demulcent drink (avoid excess), White of Egg, Milk.*

Stings, Wasp, Bee, etc.—*Ammonia or any Alkaline Solution. See also Therap. Index,* BITES AND STINGS.

Stramonium.—*See* **Atropine.**

Strophanthus.—*After evacuation by emetics and Stomach Tube, Tannin and stimulants. Anæsthetics to relieve spasm.*

Strychnine.—*Stomach Tube, Emetics, Potass. Permang. Chloral, Amyl Nitrite. Charcoal ad lib. Acid Tannic, Potass. Brom. (½ ounce in water with 30 grains of Chloral Hydrate). Patient may be kept fully under Chloroform or Ether. Artificial respiration if possible (most important).*

Sublimate.—*See* **Hydrargyrum.**

Sulphonal.—*Emetics, Stomach Tube, Strong Coffee, Strychnine, Artificial respiration.*

Sulphuretted Hydrogen.—*Amylum Iodatum.*

Tetrachlorethane.—*See Jaundice, Vol. II.*

Tobacco.—*See* **Plants, Unidentified.**

Trional.—*See* **Sulphonal.**

Turpentine.—*Empty stomach by pump or tube or give emetics—Apomorphine if necessary, Mag. Sulph., Demulcent Drinks.*

Verdigris.—*See* **Copper.**

Vermilion.—*See* **Hydrargyrum.**

Vermin Killer.—*As* **Strychnine** *or* **Arsenic,** *q.v.*

Veronal.—*Empty stomach by pump and enemata. Coffee, Strychnine, later diuretics.* See also several recent abstracts of poisoning cases under Veronal, p. 755.

Weed Killer.—*See* **Arsenic.**

White Precipitate.—*See* **Hydrarg.** *White of Egg freely*

Zinc Salts.—NOT *stomach tube. Milk and White of Egg, Olive or any innocuous Oil, Washing Soda.*

Electric Shock *as from Live Electric Wire,* also *Lightning Shock and burns. Separate from live wire by catching hold of clothing or by using a good thick layer of cloth (dry) or a newspaper. If necessary cut a live wire with long iron scissors in wood handles. For burns Boric compresses. Raise the head. Artificial respiration. See also Vol. II., Radiology Chapter.*

PROPORTIONAL DOSE TABLE ACCORDING TO AGE (*Gaubius*).

For an adult suppose the dose to be	1	or 60	grains.
Under 1 year will require	$\frac{1}{12}$	,, 5	,,
,, 2 ,, ,,	$\frac{1}{8}$	,, 8	,,
,, 3 ,, ,,	$\frac{1}{6}$	,, 10	,,
,, 4 ,, ,,	$\frac{1}{4}$	,, 15	,,
,, 7 ,, ,,	$\frac{1}{3}$	,, 20	,,
,, 14 ,, ,,	$\frac{1}{2}$	,, 30	,,
,, 20 ,, ,,	$\frac{2}{3}$	,, 40	,,
21 to 60, the full dose, or	1	,, 60	,,

Above this age, an inverse gradation must be observed.

Another rule is, for children under 12, add 12 to the age, and divide the age by the amount thus obtained; thus for 8 years $\frac{8}{8 + 12} = \frac{2}{5}$ of adult dose.—Young's Formula.

W. J. Dilling says Young's and Gaubius' methods are of little value and suggests the best formula after the 10th year is to multiply the adult dose by $\frac{\text{age} \times 5}{100}$ or by $\frac{\text{age.}}{20}$ This he found gave a curve which when plotted out coincides more closely than other systems with the curve obtained by plotting out the percentages of adult weight at ages obtained from birth to 21 years, which he considers is the average adult age. The new formula, he states, results in doses which correspond closely with those demanded—B.M.J. ii./12, 1177.

INDEX & POSOLOGICAL TABLE.

THIS index supplies the name *in Latin* as far as possible and adult dose (if used internally) of most of the drugs and preparations described in the foregoing pages. The doses are based on personal experience, or are culled from the best authorities.

Official names are printed in italics.

For **Acids** look under the word **Acid.**

For **Salts,** *vide* **Latin name** of the **base.**

For **Effervescent Preparations,** see list under the word **Effervescent.**

Some items, *e.g.*, some official Medicamenta and Pilulæ have **purposely no page**—*i.e.*, they are not further described in the book.

Customary CONTRACTIONS have been found necessary in this Index. The following may be cited :

Acid. or Ac. = Acidus,-a,-um, etc.
Alc. = Alcoholic.
Alk. = Alkalinus, etc.
Av. = Average (Dose).
Caps. = Capsula, etc.
C. = cum (with).
Co. = Compositus, etc. (or compound).
Conc. = Concentratus, etc.
Eff. = Effervescens, etc.
Emplast. = Emplastrum, etc.
Emuls. = Emulsio, etc.
Expt. = Expectorant.
Extr. = Extractum, etc.
Fluidextr. = Fluidextractum.
Glycerin = Glycerinum, etc.
Glyceroph. = Glycerophosphas, etc.
HBr. = Hydrobromidum, etc.
HCl. = Hydrochloridum, etc.
Hy. = Hydrargyrum, etc.
Hyp. = Hypodermicus, etc.
Inf. = Infusum, etc.
Inj. = Injectio, etc.
Incr. = Increased.
Linim. = Linimentum, etc.
Liq. = Liquor or Liquidus, etc.
Mag. = Magnesium, etc.
Mang. = Manganesium, etc.
Mist. = Mistura, etc.
Potass. = Potassium, etc.
Quin. = Quinina, etc.
Rad. = Radix, etc.
Rep. = Repeated.
Salicyl. = Salicylas, etc.
Sol. = Solutio, etc.
Spirit. = Spiritus, etc.
Strych. = Strychnina, etc.
Syr. = Syrupus, etc.
Tinct. = Tinctura, etc.
Ung. = Unguentum, etc. or Ointment.
Vin. = Vinum, etc.
'85 = B.P. 1885.

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Pulv. Cret. Arom. c. Op., 5 gr.	607
Quin. Acetyl-Salicyl., 3 gr.	672
,, Ethyl-Carb., 8 gr.	679
,, HBr., 3 and 5 gr.	666
,, ,, 3 gr. c. Phenac., 5 gr	666
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,, ,, Acid, 1, 3, 5 gr.	670
,, Rhei Co.	678
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Ac. 1 gr. Camph. 1/5 gr. et c. Aconite Tinct., 1 m.	677
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Red Bone Marrow, 3 gr.	912
Regenerative, 6 *per diem*	701
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Sodii Nitris, 2½ gr.	707
,, ,, Co.	708
,, Perborate Mouth	13
,, Salicyl., 3 & 5 gr., and Nascent	86
Solurol, 4 gr.	933
Spinal Cord, 2½ gr.	913
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Strontium Brom., 5 gr.	720
Strophant. Tinct., 2 & 5 m.	722
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Styptol, ¾ gr.	555

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Syr. Easton = ½ & 1 dr.	419
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Theobrom. Sod. Salicyl, 5 gr.	737
Theocin Sod. Acet., 4 gr.	739
Theophylline, 4 gr.	739
Thiocol, 5 gr.	377
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Thyminic Acid, 4 gr.	933
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Thymol Carb., 10 gr.	746
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,, Bellad., 2 & 5 m.	224
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,, Nuc. Vom., 5, 10 m.	580
,, Opii, 5 & 10 m.	608
,, Quin. Ammon. = 1 dr.	677
,, ,, ,, Comp.	677
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,, Intestinal, 3 to 6 *p.d.*	69
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Trivalin	762
Trunecek's Serum	701
Tylcalsin, 8 gr.	90
Tyllithin, 8 gr.	91
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Uranium Nit., 1 gr.	752
Urethane, 5 gr.	759
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Adrenalin, 1/300 gr., c. Cocaine HCl., ⅙ gr.	929
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Apomorph. HCl., 1/20, 1/15, 1/10 gr.	165
Atropine, Sulph., 1/200 to 1/50 gr.	213
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Caffeine Sod. Salicyl., ½ gr.	246
Cocaine Hyd., 1/10–½ gr.	324
Codeine Phosph., ¼ and ½ gr.	340

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